APPENDIX Q

Sewer Study

DEXTER WILSON ENGINEERING, INC.

WATER • WASTEWATER • RECYCLED WATER

CONSULTING ENGINEERS

SEWER STUDY
FOR THE
PALOMAR HEIGHTS PROJECT IN THE
CITY OF ESCONDIDO

March 17, 2020

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SEWER STUDY
FOR THE
PALOMAR HEIGHTS PROJECT IN THE
CITY OF ESCONDIDO

March 17, 2020

Prepared by:
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Job No. 930-012

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March 17, 2020 930-012

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2235 Encinitas Blvd., Suite 216
Encinitas, CA 92024

Attention: Ninia Hammond, Project Manager

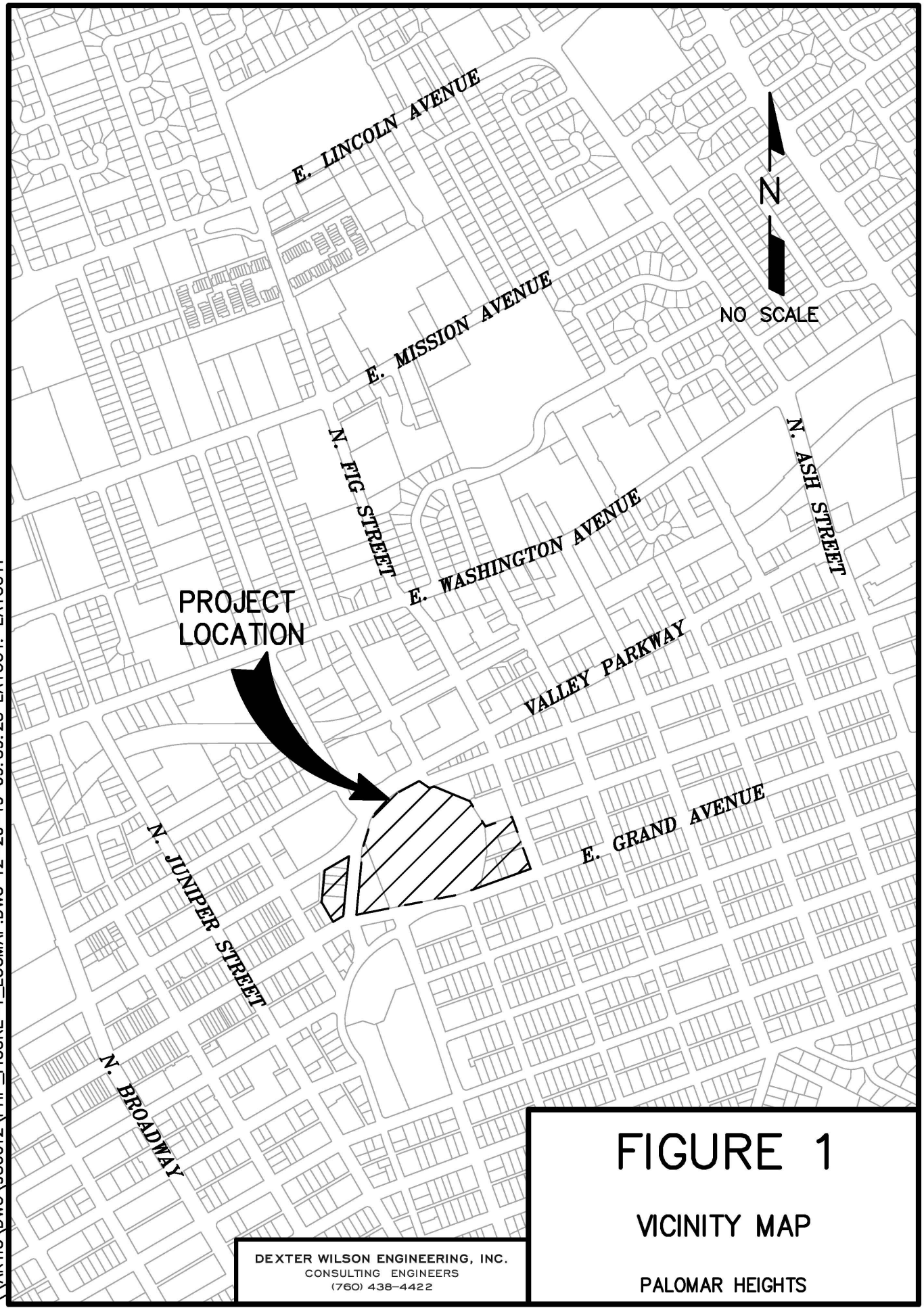
Subject: Sewer Study for the Palomar Heights Project in the City of Escondido

Introduction

The Palomar Heights project is located in the City of Escondido, south of Valley Parkway, north of East Grand Avenue, and west of Fig Street. Valley Boulevard traverses the project dividing the project into two separate areas. The western side, called the Senior Housing Building, currently encompasses office buildings and a parking lot. The eastern side, identified as the Main Residential Area, was formerly the location of the Palomar Health Downtown Campus. Access to the project will be from Valley Boulevard, Valley Parkway, and Grand Avenue. Figure 1 provides a vicinity map for the project.

The project encompasses approximately 13.8 acres and proposes to redevelop the sites with a total of 510 multi-family residential dwelling units including 90 senior apartments, 258 apartment units, 162 townhomes, 12,000 square feet of commercial space, and 4.71 acres of landscaped area.

The Senior Housing Building will include 90 senior homes and a 2,000 square feet cafe. The remaining development will be located in the Main Residential Area; the commercial components will be work space (3,000 SF), retail (2,000 SF), residents-only gym (2,000 SF), and a bar/restaurant (3,000 SF). A Preliminary Site Plan Exhibit for the Palomar Heights project is included in Appendix A.



\\ARTIC\DWG\930012\PHP_FIGURE-1_LOCMAP.DWG 12-20-19 09:39:25 LAYOUT: LAYOUT1

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FIGURE 1

VICINITY MAP

PALOMAR HEIGHTS

Sewer System Design Criteria

The Palomar Heights project will receive sewer service from the City of Escondido. The design criteria used for the evaluation of the onsite and offsite sewerage system impacts by the Palomar Heights project are based on the City of Escondido Design Standards, dated April 2, 2014 and the City of Escondido 2012 Wastewater Master Plan.

Sewage Generation. Sewage generation estimates for the proposed development were developed in accordance with the City of Escondido Design Standards, dated April 2, 2014. For residential areas, the average flow generation factor used is 200 gpd per dwelling unit. Sewage generation for commercial areas is based on an average flow generation factor of 1,500 gpd per acre.

Peaking Factors. The peaking factor equation used to convert average dry weather flow to peak dry weather flow is provided in Table 3-1 of the City of Escondido 2012 Wastewater Master Plan and is presented below for reference. Flow units for the equation are in cfs.

$$Q_{peaked} = 2.17 Q_{average}^{0.975}$$

Manning's "n". The gravity sewer analyses are made using a computer spreadsheet which uses the Manning Equation for all of its calculations. The Manning's "n" used is held constant for all depths in a circular conduit. The value of Manning's "n" used for this study is 0.013.

Depth and Velocity of Flow in Gravity Sewers. Gravity sewer lines are designed to convey peak wet weather flow. For sewer lines smaller than 12-inch, the depth-to-diameter (d/D) ratio must not exceed 0.50. For sewer lines 12-inch and larger, the d/D ratio must not exceed 0.75.

Gravity sewer lines are designed to maintain a minimum velocity of 2.0 feet per second (fps) at average flow to prevent the deposition of solids.

Sewer Generation

Sewer generation estimates were developed in accordance with the City of Escondido Design Standards, dated April 2, 2014. As shown in Table 1, the projected average dry weather sewer flow for the Palomar Heights project is 102,420 gpd.

TABLE 1
PALOMAR HEIGHTS PROJECT
SEWER GENERATION

Land Use	Units	Sewer Generation Factor	Average Dry Weather Flow, gpd
Multi-Family Residential	420 DU	200 gpd/EDU	84,000
Senior Housing	90 DU	200 gpd/EDU	18,000
Commercial	0.28 acres	1,500 gpd/acre	420
TOTAL			**102,420 = 0.1585 cfs**

An average dry weather flow of 102,420 gpd results in a peak dry weather flow of 232,727 gpd based on the peaking factor equation provided in Table 3-1 of the City of Escondido 2012 Wastewater Master Plan.

Existing Sewer System

Existing sewer facilities pertinent to the Palomar Heights project consist of gravity sewer lines. Figure 2 presents the existing sewer facilities in the vicinity of the Palomar Heights project.

There are existing local gravity sewer lines adjacent to the Palomar Heights project that serve existing development within and around the property. There is an existing 6-inch sewer main in the alley between Valley Parkway and Grand Avenue, west of Valley Boulevard. This sewer conveys flow west in the alley and then north in Juniper Street to an existing 21-inch trunk sewer in Pennsylvania Avenue.

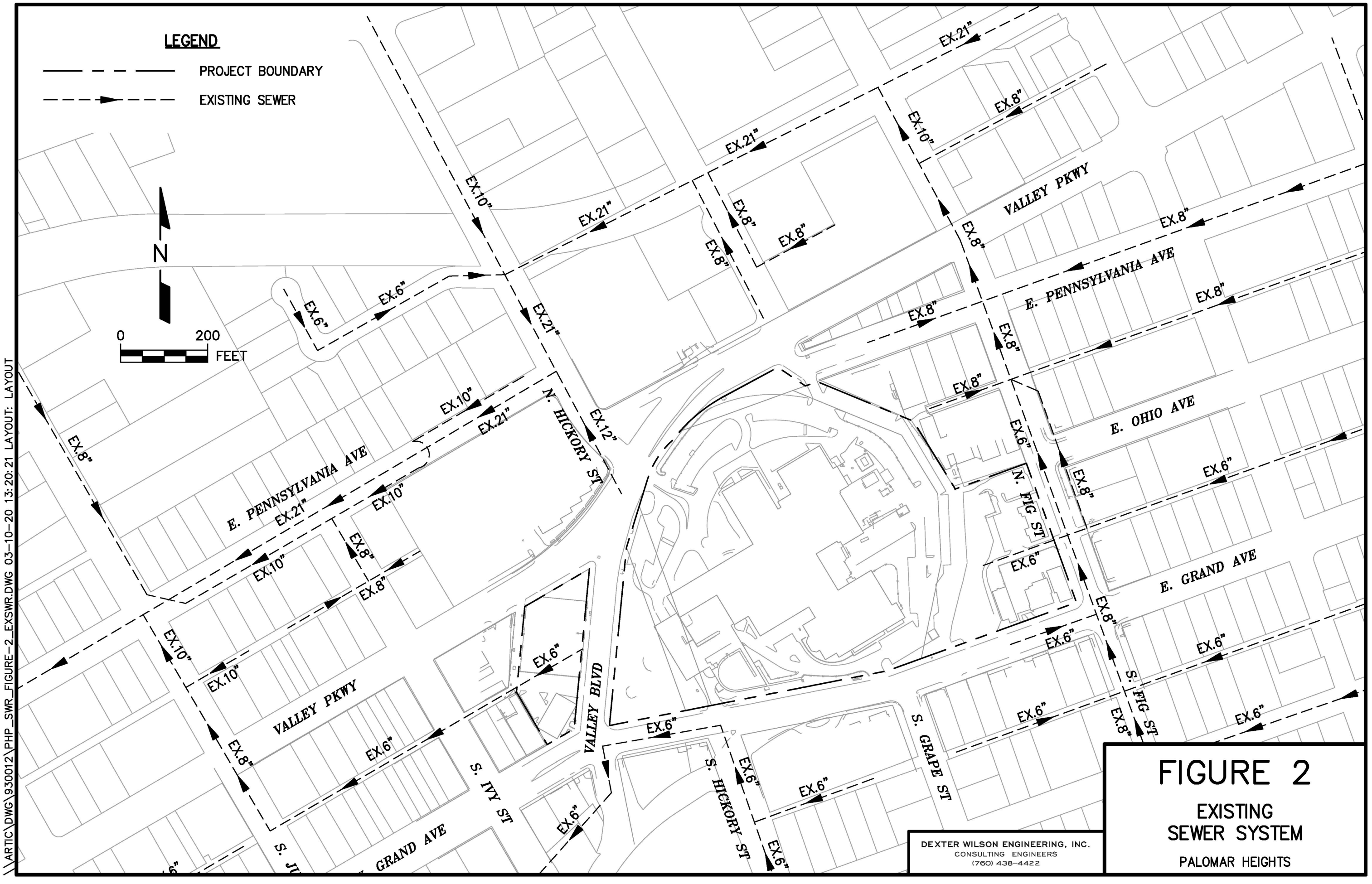

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FIGURE 2

EXISTING SEWER SYSTEM

PALOMAR HEIGHTS

The upstream portion of this existing sewer line will need to be removed as it will be in the way of the proposed Senior Housing Building. Sewer service for the Senior Apartments building will be extended north in Valley Boulevard along the property frontage and connect to the Hickory Street sewer.

On the west side of the Palomar Heights Main Residential Area, there is an existing 12-inch sewer main in Hickory Street near the northwest corner of the project. This sewer line provided service to the Palomar Health Downtown Campus prior to its closing in 2015. This sewer line conveys flow north to the existing 21-inch trunk sewer at the intersection of Hickory Street and Pennsylvania Avenue.

On the east side of the Palomar Heights site there are existing 6", 8" and 10" gravity sewer lines in Fig Street which flow north to the 21-inch trunk sewer north of Valley Parkway. These sewer mains in Fig Street provide service currently to the medical buildings on the west side of Fig Street between Grand Avenue and Ohio Avenue; these buildings are part of the future Palomar Heights development project. In addition, there is a large sewer service area to the east and south of the Fig Street which flows through the Fig Street sewer mains.

Generally, the existing 21-inch trunk sewer conveys sewage flow southwest. Sewage flow from the trunk sewer is ultimately conveyed to the City of Escondido Hale Avenue Resource Recovery Facility for treatment and disposal.

Overview of Proposed Sewer Service

Onsite sewer facilities for the Main Residential Area are proposed to include a backbone public gravity sewer collection system. For residential housing clusters with driveway access, private sewer collection facilities will be used to convey sewer flow to the backbone public gravity sewer system onsite. The Senior Housing Building site consists of a single building; therefore, there is no need to have a public sewer system onsite.

There are two alternative ways to provide sewer service to the Palomar Heights project. One alternative is to connect the entire project to the Hickory Street sewer at the northwest end of the site. A second alternative is to connect the majority of the Palomar Heights site to the Hickory Street sewer and connect up to 72 dwelling units at the southeast end of the site to

the sewer in Fig Street. Using this second alternative to sewer the site enables the onsite public sewer flowing to Hickory Street to be constructed at standard depths rather than depths of up to 16.6 feet as proposed in the first sewer alternative. Sewers at standard depths facilitates better access for sewer maintenance and repair.

The Senior Apartments Building will extend a new 8-inch gravity sewer along Valley Boulevard from the existing sewer line which flows north on Hickory Street. A new 6-inch sewer lateral will be constructed from the Senior Apartments Building to the new sewer main in Valley Boulevard; as well a new 4-inch sewer lateral is proposed to connect the commercial component of the Senior Apartments Building to the new 8-inch sewer in Valley Boulevard. As mentioned earlier, a portion of the existing 6-inch gravity sewer in the alley west of the proposed Senior Apartments Building will need to be removed to allow for the construction of the Senior Apartments Building.

Generally, the sewer collection system for the Palomar Heights project will direct sewage flow toward the existing 21-inch sewer located north of the project. Figure 3 presents the proposed backbone sewer collection system for the Palomar Heights project under Alternative 1. Figure 4 shows the onsite system under Alternative 2.

Onsite Public Sewer System Analysis

The onsite public sewer analysis calculates the depth of flow and flow velocities in the proposed public sewer collection system for the Palomar Heights project under Alternative 1. As previously mentioned, the Senior Housing Building will not have a public sewer system onsite. The Main Residential Area will have a backbone public gravity sewer collection system onsite. The offsite public sewer systems downstream of the project are analyzed in subsequent sections of this report.

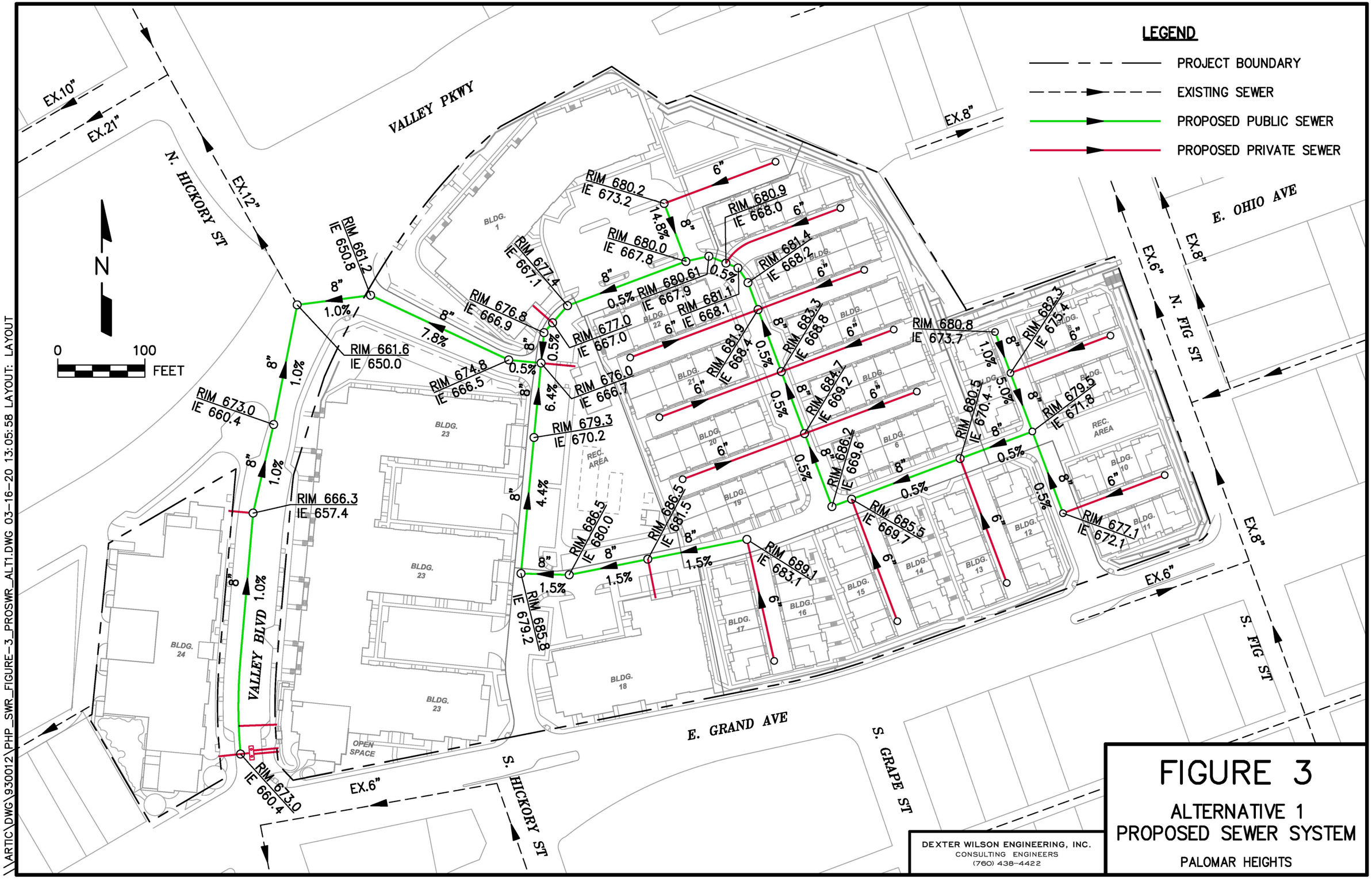

FIGURE 3

ALTERNATIVE 1
PROPOSED SEWER SYSTEM

PALOMAR HEIGHTS

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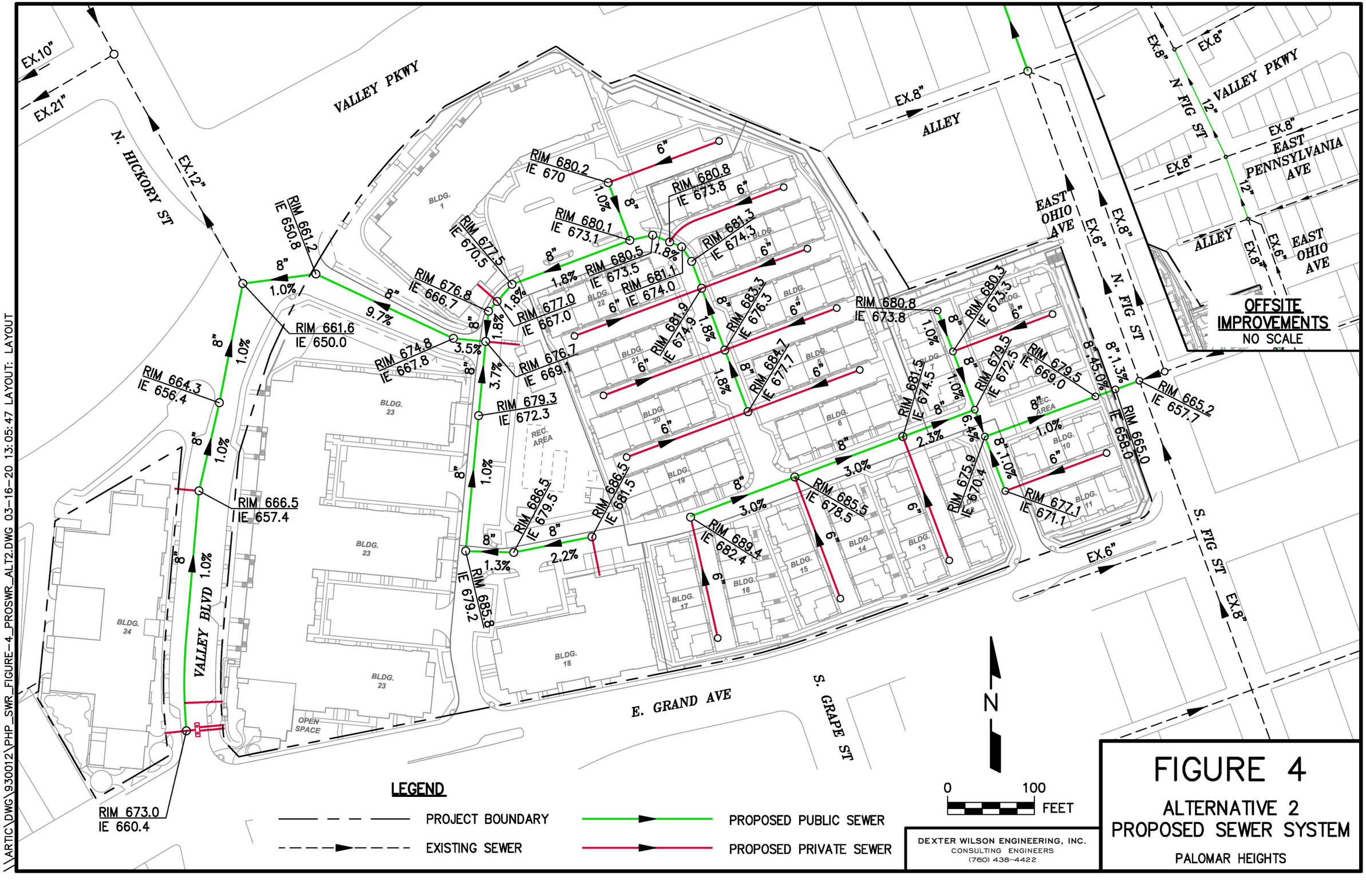

FIGURE 4

ALTERNATIVE 2
PROPOSED SEWER SYSTEM

PALOMAR HEIGHTS

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Onsite public sewer line slopes for Main Residential Area are based on a preliminary design of the sewer system by the project civil engineer. The onsite sewer system was designed to convey onsite flow to the existing 12-inch public sewer main in Hickory Street near the northwest corner of the project. In order to achieve gravity flow to Hickory Street while maintaining minimum depth of cover over pipes, sewer slopes were kept at a minimum of one percent on the south side of the project site.

Figure 3 presents approximate finish grade elevations and invert elevations for each public manhole onsite as well as slopes for the proposed public sewer lines onsite. The deepest sewer will be approximately 16.6 feet below finish grade.

Average dry weather flow for the Main Residential Area of the project is estimated to be 84,000 plus the commercial component of 350 gpd for a total of 84,350 gpd; the balance of the total project flow comes from the Senior Apartments Building, 18,000 gpd plus the commercial component of 70 gpd for a total of 18,070 gpd. Average sewage flow analysis was done to determine the flow velocities in the sewer mains. Peak sewage flow was used to confirm the depth-to-diameter criteria for the onsite system.

Onsite Analysis Results – Alternative 1. Appendix B presents the results of the proposed Alternative 1 onsite gravity sewer system for the Main Residential Area under average flow and peak flow. The corresponding Manhole Numbering Diagram is presented as Exhibit A.

Depth of flow in the proposed 8-inch onsite gravity sewers under peak flow does not exceed 0.41 d/D. Flow velocities for the onsite sewers under average flow range from a low of 0.9 fps to a maximum of 4.5 fps. Low flow velocities are associated with the sewer lines whose slope is one-half of one percent; some such segments are located at the upper ends of the sewer collection system. As noted earlier in this report, Alternative 1 includes approximately 177 linear feet of public gravity sewer and 50 feet of private gravity sewer at a depth of greater than 15 feet; the maximum depth in this segment of public gravity sewer pipe is 16.6 feet.

Onsite Analysis Results – Alternative 2. Appendix C presents the results of the proposed Alternative 2 onsite gravity sewer system for the Main Residential Area under average flow and peak flow. The corresponding Manhole Numbering Diagram is presented as Exhibit B.

Depth of flow in the proposed 8-inch onsite gravity sewers under peak flow does not exceed 0.31 d/D. Flow velocities for the onsite sewers under average flow range from a low of 0.8 fps to a maximum of 6.2 fps. Low flow velocities are associated with the sewer lines whose slope is at least one percent, but are located at the upper ends of the sewer collection system. The Alternative 2 onsite public sewer system includes the southeastern portion of the Palomar Heights project flowing to Fig Street. The connection to the existing sewer in Fig Street is proposed to be made to the existing sewer manhole on the west side of the intersection of Fig Street and the alley between Grand Avenue and Ohio Avenue.

As noted earlier in this report, Alternative 2 includes sewers built at standard depths, the maximum depth being 10.5 feet for the sewer connecting to Fig Street. The majority of public sewer lines under Alternative 2 are 7 to 8 feet deep. Standard depths facilitate better access for maintenance and repair. In addition to the public sewer, Alternative 2 enables the shallowing of all the private sewer within the site eliminating the 50 feet of sewer greater than 15 feet deep under Alternative 1. This results in the private sewer having better access for maintenance and repair.

Offsite Public Sewer System Analyses

The next step is to analyze the impact of the Palomar Heights project on the existing offsite public sewer system. The existing public sewer system was analyzed under existing flows and under existing flows plus proposed flows for both sewer service alternatives.

Alternative 1 - Hickory Street Sewer Main Analysis. The Alternative 1 offsite public sewer system analysis for the Main Residential Area and the Senior Apartments Building encompasses the existing 12-inch public sewer main in Hickory Street. An As-Built for this line is included in Appendix D. Under the Alternative 1 sewer scenario, the public sewer main in Hickory Street will serve the Palomar Heights project exclusively as it does not serve any other existing customers. This was the connection used formerly by the Palomar Health Downtown Campus.

Since Palomar Health Downtown Campus is no longer in service, the existing 12-inch sewer in Hickory will not be analyzed for existing flows. Alternative 1 proposes that the entire Palomar Heights development flows to the existing 12-inch main in Hickory Street. This will encompass the total of 510 residential dwelling units plus the 0.28 acres of commercial space (12,000 square feet) within the Palomar Heights project. The total estimated average dry weather flow as shown in Table 1 is 102,420 gpd.

Hickory Street Sewer Main Analysis Results. The analysis of the existing 12-inch sewer in Hickory Street with Palomar Heights build-out project flows is presented in Appendix E and a Manhole Diagram is provided as Exhibit A.

Under average day flows, the velocity in the existing 12-inch sewer line is 2.97 fps. Depth of flow is 0.12 d/D.

For peak hour flow, the velocity in the existing 12-inch sewer line is 3.75 fps. Depth of flow is 0.18 d/D.

In both cases, the flow velocity and depth-to-diameter design criteria is satisfied. Therefore, for Alternative 1 there are no offsite improvements necessary for the Palomar Heights project, except for the new 8-inch sewer needed in Valley Boulevard for the Senior Apartments Building and the commercial component of the Main Residential Area at the south end of Valley Boulevard. The existing 12-inch sewer line in Hickory Street has adequate capacity to serve the project.

Alternative 2 – Fig Street Sewer Main Analysis. The Alternative 2 offsite public sewer system analysis approach for the Main Residential Area and the Senior Apartments Building is to split the Palomar Heights site into two separate sewer sub-basins. The larger, western portion of the project including the Senior Apartments Building will continue to sewer west to Hickory Street. The southeast portion of the site would sewer to Fig Street.

Of the total 510 dwelling units within the project, up to 72 dwelling units would be directed to the Fig Street sewer under Alternative 2. This includes the units from Buildings 7 – 17. A new sewer would extend from the Palomar Heights site to the existing western manhole in the intersection of Fig Street and the alley between Grand Avenue and Ohio Avenue.

In this intersection there are two manholes; the west manhole ties to the existing 6" gravity sewer in Fig Street flowing north. The east manhole ties to an existing 8-inch relief sewer also flowing north. These two parallel gravity sewers combine into one 8-inch line at the alley between Ohio Avenue and Pennsylvania Avenue. This existing 8" sewer continues north increasing to a 10" sewer at the alley north of East Valley Parkway after which it ties into the 21" sewer interceptor parallel to the south side of Escondido Creek (reference Figure 2).

The existing sewer in Fig Street collects flow from a large service area to the south and east of the Palomar Heights project site. The sewer service area extends south to 5th Avenue and east to Cedar Street. The Fig Street sewer service sub-basins are identified on a map included in Appendix F. These sub-basins were used to estimate the existing sewage flow in the sewer system based on land use and the City of Escondido sewage generation factors.

Appendix G presents the results of the sewer analysis in Fig Street. Under existing peak flows, the 6" and 8" sewers flow over the design criterion of d/D = 0.50; the 6" line flows at 0.63 and the 8" segments are at 0.54 and 0.58 d/D. This analysis is based on all the flow going through the existing 6" sewer between the alleys on either side of Ohio Avenue. In this reach of sewer there is also an 8" relief sewer which takes any excess flow from the 6" sewer.

Under existing plus Palomar Heights project flows which is presented in Appendix C, the analysis was done based on splitting the sewage flow equally between the existing 6" sewer and its parallel 8" relief sewer. With the peak flow in each sewer being about equal (126,595 gpd), the depth in the 6" sewer is 0.47 d/D and in the 8" relief sewer it is 0.45 d/D. The two existing 8" sewer segments downstream of the 6" and 8" relief sewers flow at 0.58 and 0.61 d/D, respectively. The existing 10" sewer just prior to the 21" interceptor is flowing at d/D = 0.26 under this same condition: existing peak flow plus project peak flow.

To conform to the City of Escondido Utility Department's sewer design criterion for depth of flow, sewers flowing over half-full would have to be replaced. The existing 6-inch gravity sewer and its parallel 8-inch relief sewer both flow under half full. Thus, no upsizing is needed in this reach. Only the two reaches of 8-inch sewer pipe from the alley north of Ohio Avenue to the alley north of Valley Parkway would need to be increased by one pipe diameter

from 8-inch to 10-inch pipe. The total length of the necessary upgrade in Fig Street is approximately 540 linear feet of 8-inch pipe to 10-inch pipe.

With the two 8-inch sewer pipe segments upgraded to 10-inch diameter, the existing peak sewage flow plus peak flow from the Palomar Heights project (up to 72 dwelling units) will flow at a depth-to-diameter ratio of 0.41 and 0.43 d/D. This sewer analysis is provided in Appendix C.

Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the sewer system analysis prepared for the proposed Palomar Heights development project in the City of Escondido.

1. The Palomar Heights project consisting of 510 dwelling units and commercial, and park uses will gravity sewer to the existing 21-inch public trunk sewer north of the project.

2. The Palomar Heights project is divided into two separate areas by Valley Boulevard; the western side called the Senior Apartments Building and the eastern side identified as the Main Residential Area.

3. The Senior Housing Building will connect to a new 8-inch sewer main to be constructed in Valley Boulevard which will connect to the existing 12-inch Hickory Street sewer main.

4. The Main Residential Area will include an onsite public sewer system which will sewer in one of two alternatives: Alternative 1 – entirely to Hickory Street; or Alternative 2 – to Hickory and Fig Streets.

5. Sewer Alternative 1 has the entire Palomar Heights site sewering to the existing 12-inch gravity sewer in Hickory Street to the northwest of the project site. This existing 12-inch sewer has adequate capacity to accommodate the Palomar Heights project.

6. Sewer Alternative 1 results in 177 linear feet of public gravity sewer and 50 feet of private gravity sewer deeper than 15 feet. These conditions make it more difficult for the City to operate, maintain, and repair the public onsite sewers.

7. Sewer Alternative 2 has the majority of the Palomar Heights project sewering to Hickory Street. A maximum of 72 dwelling units would flow east to Fig Street.

8. Under Sewer Alternative 2, offsite sewer improvements are needed to the existing 8-inch public sewer in Fig Street north of the alley between Ohio Avenue and Pennsylvania Avenue. Approximately 540 feet of 8-inch gravity sewer would need to be upsized to 10-inch pipe to meet the City's sewer design depth of flow criterion.

9. Public onsite gravity sewer mains within the Main Residential Area of the Palomar Heights project are 8-inch diameter designed at a minimum slope of 0.5 percent under Alternative 1 and one percent under Alternative 2.

10. New sewer lines shall be designed to meet all requirements of the City of Escondido Design Standards, dated April 2, 2014 or latest edition, and to the satisfaction of the Director of Utilities. Final design will be reflected on the improvement plans to be submitted for review and approval.

If you have any questions regarding the information or conclusions and recommendations presented in this report, please do not hesitate to contact the undersigned.

Dexter Wilson Engineering, Inc.

Andrew Oven, P.E.

AO:FF:ps

Attachments

APPENDIX A

PRELIMINARY SITE LAYOUT

PALOMAR HEIGHTS

COLORED SITE PLAN EXHIBIT

ESCONDIDO
City of Choice

APPENDIX B

ALTERNATIVE 1
ONSITE SEWER SYSTEM ANALYSIS
FOR PALOMAR HEIGHTS
AVERAGE FLOW AND PEAK FLOW

DATE: 3/16/2020

JOB NUMBER: 930-012

SEWER STUDY SUMMARY

FOR: Palomar Heights - Alternative 1 Sewer Analysis - Average Flows

BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1

REFER TO PLAN SHEET:

930-012
3/16/2020

FROM	TO	IN-LINE COM. NET ACRES	CUMULATIVE COM. NET ACRES	IN-LINE IND. NET ACRES	CUMULATIVE IND. NET ACRES	IN-LINE RES. EDUs	CUMULATIVE RES EDUs	AVG. COMBINED DRY WEATHER FLOW (GPD)	AVG. COMBINED DRY WEATHER FLOW (CFS)	AVG FLOW (CFS)	COMBINED PEAK FLOW (DESIGN FLOW)			LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' [1]	dn (feet)	dn/D[2]	C_a for Velocity[3]	VELOCITY (f.p.s.)
											GPD	MGD	CFS							
208	206	0.0	0.0	0.0	0.0	14.0	14.0	2,800	0.00	0.00	2,800	0.003	0.004	8	1.00	0.001661	0.02667	0.04	0.0105	0.93
206	204	0.0	0.0	0.0	0.0	43.0	57.0	11,400	0.02	0.02	11,400	0.011	0.018	8	1.50	0.005520	0.05333	0.08	0.0294	1.35
204	201	0.0	0.0	0.0	0.0	0.0	57.0	11,400	0.02	0.02	11,400	0.011	0.018	8	1.50	0.005520	0.05333	0.08	0.0294	1.35
201	200	0.00	0.0	0.0	0.0	43.0	100.0	20,000	0.03	0.03	20,000	0.020	0.031	8	4.40	0.005655	0.05333	0.08	0.0294	2.37
200	104	0.0	0.0	0.0	0.0	86.0	186.0	37,200	0.06	0.06	37,200	0.037	0.058	8	6.40	0.008721	0.06667	0.10	0.0409	3.17
340	338	0.0	0.0	0.0	0.0	9.0	9.0	1,800	0.00	0.00	1,800	0.002	0.003	8	1.00	0.001068	0.02667	0.04	0.0105	0.60
338	334	0.0	0.0	0.0	0.0	9.0	18.0	3,600	0.01	0.01	3,600	0.004	0.006	8	0.50	0.003019	0.04000	0.06	0.0192	0.65
336	334	0.0	0.0	0.0	0.0	12.0	12.0	2,400	0.00	0.00	2,400	0.002	0.004	8	0.50	0.002013	0.03333	0.05	0.0147	0.57
334	332	0.0	0.0	0.0	0.0	0.0	30.0	6,000	0.01	0.01	6,000	0.006	0.009	8	0.50	0.005032	0.04667	0.07	0.0242	0.86
332	331	0.0	0.0	0.0	0.0	14.0	44.0	8,800	0.01	0.01	8,800	0.009	0.014	8	0.50	0.007381	0.06000	0.09	0.0350	0.88
331	330	0.0	0.0	0.0	0.0	14.0	58.0	11,600	0.02	0.02	11,600	0.012	0.018	8	0.50	0.009729	0.06667	0.10	0.0409	0.99
330	328	0.0	0.0	0.0	0.0	20.0	78.0	15,600	0.02	0.02	15,600	0.016	0.024	8	0.50	0.013084	0.08000	0.12	0.0534	1.02
328	326	0.0	0.0	0.0	0.0	20.0	98.0	19,600	0.03	0.03	19,600	0.020	0.030	8	0.50	0.016439	0.08667	0.13	0.0600	1.14
326	324	0.0	0.0	0.0	0.0	30.0	128.0	25,600	0.04	0.04	25,600	0.026	0.040	8	0.50	0.021471	0.10000	0.15	0.0739	1.21
324	322	0.0	0.0	0.0	0.0	0.0	128.0	25,600	0.04	0.04	25,600	0.026	0.040	8	0.50	0.021471	0.10000	0.15	0.0739	1.21
322	320	0.0	0.0	0.0	0.0	0.0	128.0	25,600	0.04	0.04	25,600	0.026	0.040	8	0.50	0.021471	0.10000	0.15	0.0739	1.21
320	316	0.0	0.0	0.0	0.0	0.0	128.0	25,600	0.04	0.04	25,600	0.026	0.040	8	0.50	0.021471	0.10000	0.15	0.0739	1.21
316	314	0.0	0.0	0.0	0.0	10.0	138.0	27,600	0.04	0.04	27,600	0.028	0.043	8	0.50	0.023149	0.10000	0.15	0.0739	1.30
314	312	0.0	0.0	0.0	0.0	0.0	138.0	27,600	0.04	0.04	27,600	0.028	0.043	8	0.50	0.023149	0.10000	0.15	0.0739	1.30
313	312	0.0	0.0	0.0	0.0	10.0	10.0	2,000	0.00	0.00	2,000	0.002	0.003	8	14.80	0.000308	0.01333	0.02	0.0037	1.88
312	308	0.0	0.0	0.0	0.0	0.0	148.0	29,600	0.05	0.05	29,600	0.030	0.046	8	0.50	0.024826	0.10667	0.16	0.0811	1.27
308	304	0.0	0.0	0.0	0.0	0.0	148.0	29,600	0.05	0.05	29,600	0.030	0.046	8	0.50	0.024826	0.10667	0.16	0.0811	1.27
304	300	0.0	0.0	0.0	0.0	86.0	234.0	46,800	0.07	0.07	46,800	0.047	0.072	8	0.50	0.039252	0.13333	0.20	0.1118	1.46
300	104	0.0	0.0	0.0	0.0	0.0	234.0	46,800	0.07	0.07	46,800	0.047	0.072	8	0.50	0.039252	0.13333	0.20	0.1118	1.46
104	102	0.0	0.00	0.0	0.0	0.0	420.0	84,000	0.13	0.13	84,000	0.084	0.130	8	0.50	0.070453	0.17333	0.26	0.1623	1.80
102	100	0.0	0.00	0.0	0.0	0.0	420.0	84,000	0.13	0.13	84,000	0.084	0.130	8	7.80	0.017838	0.08667	0.13	0.0600	4.87
100	6452	0.0	0.00	0.0	0.0	0.0	420.0	84,000	0.13	0.13	84,000	0.084	0.130	8	1.00	0.049818	0.14667	0.22	0.1281	2.28
414	404	0.3	0.28	0.0	0.0	90.0	90.0	18,420	0.03	0.03	18,420	0.018	0.029	8	1.00	0.010924	0.07333	0.11	0.0470	1.36
404	402	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.03	18,420	0.018	0.029	8	1.00	0.010924	0.07333	0.11	0.0470	1.36
402	6452	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.03	18,420	0.018	0.029	8	1.00	0.010924	0.07333	0.11	0.0470	1.36

Total
510.0

Min Slope
0.50

Max dn/D
0.26

COM. = Commercial

IND. = Industrial

RES. = Residential

Note: 1 Commercial Acre = 1,500 gpd

1 Industrial Acre = 2,000 gpd

1 Residential EDU = 200 gpd

Peak Flow = 2.17 $(Q_A)^{0.95}$ [flows in cfs]

1 K' based on n = 0.013

2 dn/D using K' in Brater King Table 7-14

3 From Brater King Table 7-4 based on dn/D

DATE: 3/16/2020

SEWER STUDY SUMMARY

930-012
3/16/2020

FOR: Palomar Heights - Alternative 1 Sewer Analysis - Peak Flows

SHT 1 OF 1

JOB NUMBER: 930-012

BY: Dexter Wilson Engineering, Inc.

REFER TO PLAN SHEET:

FROM	TO	IN-LINE COM. NET ACRES	CUMULATIVE COM. NET ACRES	IN-LINE IND. NET ACRES	CUMULATIVE IND. NET ACRES	IN-LINE RES. EDUs	CUMULATIVE RES EDUs	AVG. COMBINED DRY WEATHER FLOW (GPD)	AVG. COMBINED DRY WEATHER FLOW (CFS)	PEAK FLOW (CFS)	COMBINED PEAK FLOW (DESIGN FLOW)			LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' [1]	dn (feet)	dn/D[2]	C_a for Velocity[3]	VELOCITY (f.p.s.)
											GPD	MGD	CFS							
208	206	0.0	0.0	0.0	0.0	14.0	14.0	2,800	0.00	0.01	6,961	0.007	0.011	8	1.00	0.004129	0.04667	0.07	0.0242	1.00
206	204	0.0	0.0	0.0	0.0	43.0	57.0	11,400	0.02	0.04	27,365	0.027	0.042	8	1.50	0.013251	0.08000	0.12	0.0534	1.78
204	201	0.0	0.0	0.0	0.0	0.0	57.0	11,400	0.02	0.04	27,365	0.027	0.042	8	1.50	0.013251	0.08000	0.12	0.0534	1.78
201	200	0.00	0.0	0.0	0.0	43.0	100.0	20,000	0.03	0.07	47,340	0.047	0.073	8	4.40	0.013385	0.08000	0.12	0.0534	3.09
200	104	0.0	0.0	0.0	0.0	86.0	186.0	37,200	0.06	0.13	86,696	0.087	0.134	8	6.40	0.020324	0.09333	0.14	0.0668	4.52
340	338	0.0	0.0	0.0	0.0	9.0	9.0	1,800	0.00	0.01	4,525	0.005	0.007	8	1.00	0.002684	0.03333	0.05	0.0147	1.07
338	334	0.0	0.0	0.0	0.0	9.0	18.0	3,600	0.01	0.01	8,894	0.009	0.014	8	0.50	0.007460	0.06000	0.09	0.0350	0.88
336	334	0.0	0.0	0.0	0.0	12.0	12.0	2,400	0.00	0.01	5,990	0.006	0.009	8	0.50	0.005024	0.04667	0.07	0.0242	0.86
334	332	0.0	0.0	0.0	0.0	0.0	30.0	6,000	0.01	0.02	14,636	0.015	0.023	8	0.50	0.012275	0.07333	0.11	0.0470	1.08
332	331	0.0	0.0	0.0	0.0	14.0	44.0	8,800	0.01	0.03	21,261	0.021	0.033	8	0.50	0.017832	0.08667	0.13	0.0600	1.23
331	330	0.0	0.0	0.0	0.0	14.0	58.0	11,600	0.02	0.04	27,833	0.028	0.043	8	0.50	0.023345	0.10000	0.15	0.0739	1.31
330	328	0.0	0.0	0.0	0.0	20.0	78.0	15,600	0.02	0.06	37,155	0.037	0.057	8	0.50	0.031163	0.12000	0.18	0.0961	1.35
328	326	0.0	0.0	0.0	0.0	20.0	98.0	19,600	0.03	0.07	46,416	0.046	0.072	8	0.50	0.038930	0.13333	0.20	0.1118	1.45
326	324	0.0	0.0	0.0	0.0	30.0	128.0	25,600	0.04	0.09	60,222	0.060	0.093	8	0.50	0.050510	0.14667	0.22	0.1281	1.64
324	322	0.0	0.0	0.0	0.0	0.0	128.0	25,600	0.04	0.09	60,222	0.060	0.093	8	0.50	0.050510	0.14667	0.22	0.1281	1.64
322	320	0.0	0.0	0.0	0.0	0.0	128.0	25,600	0.04	0.09	60,222	0.060	0.093	8	0.50	0.050510	0.14667	0.22	0.1281	1.64
320	316	0.0	0.0	0.0	0.0	0.0	128.0	25,600	0.04	0.09	60,222	0.060	0.093	8	0.50	0.050510	0.14667	0.22	0.1281	1.64
316	314	0.0	0.0	0.0	0.0	10.0	138.0	27,600	0.04	0.10	64,805	0.065	0.100	8	0.50	0.054353	0.15333	0.23	0.1365	1.65
314	312	0.0	0.0	0.0	0.0	0.0	138.0	27,600	0.04	0.10	64,805	0.065	0.100	8	0.50	0.054353	0.15333	0.23	0.1365	1.65
313	312	0.0	0.0	0.0	0.0	10.0	10.0	2,000	0.00	0.01	5,014	0.005	0.008	8	14.80	0.000773	0.02000	0.03	0.0069	2.53
312	308	0.0	0.0	0.0	0.0	0.0	148.0	29,600	0.05	0.11	69,379	0.069	0.107	8	0.50	0.058190	0.16000	0.24	0.1449	1.67
308	304	0.0	0.0	0.0	0.0	0.0	148.0	29,600	0.05	0.11	69,379	0.069	0.107	8	0.50	0.058190	0.16000	0.24	0.1449	1.67
304	300	0.0	0.0	0.0	0.0	86.0	234.0	46,800	0.07	0.17	108,445	0.108	0.168	8	0.50	0.090956	0.20000	0.30	0.1982	1.90
300	104	0.0	0.0	0.0	0.0	0.0	234.0	46,800	0.07	0.17	108,445	0.108	0.168	8	0.50	0.090956	0.20000	0.30	0.1982	1.90
104	102	0.0	0.00	0.0	0.0	0.0	420.0	84,000	0.13	0.30	191,819	0.192	0.297	8	0.50	0.160884	0.27333	0.41	0.3032	2.20
102	100	0.0	0.00	0.0	0.0	0.0	420.0	84,000	0.13	0.30	191,819	0.192	0.297	8	7.80	0.040733	0.13333	0.20	0.1118	5.97
100	6452	0.0	0.00	0.0	0.0	0.0	420.0	84,000	0.13	0.30	191,819	0.192	0.297	8	1.00	0.113762	0.22667	0.34	0.2355	2.84
414	404	0.3	0.28	0.0	0.0	90.0	90.0	18,420	0.03	0.07	43,690	0.044	0.068	8	1.00	0.025911	0.10667	0.16	0.0811	1.88
404	402	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.07	43,690	0.044	0.068	8	1.00	0.025911	0.10667	0.16	0.0811	1.88
402	6452	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.07	43,690	0.044	0.068	8	1.00	0.025911	0.10667	0.16	0.0811	1.88

Total
510.0

Min Slope
0.50

Max dn/D
0.41

COM. = Commercial

IND. = Industrial

RES. = Residential

Note: 1 Commercial Acre = 1,500 gpd

1 Industrial Acre = 2,000 gpd

1 Residential EDU = 200 gpd

Peak Flow = 2.17 $(Q_A)^{0.95}$ [flows in cfs]

1 K' based on n = 0.013

2 dn/D using K' in Brater King Table 7-14

3 From Brater King Table 7-4 based on dn/D

APPENDIX C

ALTERNATIVE 2
ONSITE SEWER SYSTEM ANALYSIS
FOR PALOMAR HEIGHTS
AVERAGE FLOW AND PEAK FLOW

DATE: 3/16/2020

JOB NUMBER: 930-012

SEWER STUDY SUMMARY

FOR: Palomar Heights - Alternative 2 Hickory & Fig Sewer Analysis - Average Flows

BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1

REFER TO PLAN SHEET:

930-012
3/17/2020

FROM	TO	IN-LINE COM. NET ACRES	CUMULATIVE COM. NET ACRES	IN-LINE IND. NET ACRES	CUMULATIVE IND. NET ACRES	IN-LINE RES. EDUs	CUMULATIVE RES EDUs	AVG. COMBINED DRY WEATHER FLOW (GPD)	AVG. COMBINED DRY WEATHER FLOW (CFS)	AVG FLOW (CFS)	COMBINED PEAK FLOW (DESIGN FLOW)			LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' [1]	dn (feet)	dn/D[2]	C_a for Velocity[3]	VELOCITY (f.p.s.)
											GPD	MGD	CFS							
513	511	0.0	0.0	0.0	0.0	14.0	14.0	2,800	0.00	0.00	2,800	0.003	0.004	8	3.00	0.000959	0.02000	0.03	0.0069	1.41
511	509	0.0	0.0	0.0	0.0	14.0	28.0	5,600	0.01	0.01	5,600	0.006	0.009	8	3.00	0.001917	0.03333	0.05	0.0147	1.33
509	507	0.0	0.0	0.0	0.0	14.0	42.0	8,400	0.01	0.01	8,400	0.008	0.013	8	2.30	0.003285	0.04000	0.06	0.0192	1.52
529	527	0.0	0.0	0.0	0.0	3.0	3.0	600	0.00	0.00	600	0.001	0.001	8	1.00	0.000356	0.01333	0.02	0.0037	0.56
527	507	0.0	0.0	0.0	0.0	15.0	18.0	3,600	0.01	0.01	3,600	0.004	0.006	8	1.00	0.002135	0.03333	0.05	0.0147	0.85
507	505	0.0	0.0	0.0	0.0	0.0	60.0	12,000	0.02	0.02	12,000	0.012	0.019	8	6.40	0.002813	0.04000	0.06	0.0192	2.18
521	505	0.0	0.0	0.0	0.0	12.0	72.0	14,400	0.02	0.02	14,400	0.014	0.022	8	1.00	0.008540	0.06000	0.09	0.0350	1.43
505	503	0.0	0.0	0.0	0.0	0.0	72.0	14,400	0.02	0.02	14,400	0.014	0.022	8	1.00	0.008540	0.06000	0.09	0.0350	1.43
503	501	0.0	0.0	0.0	0.0	0.0	72.0	14,400	0.02	0.02	14,400	0.014	0.022	8	45.00	0.001273	0.02667	0.04	0.0105	4.77
501	6452	0.0	0.0	0.0	0.0	0.0	72.0	14,400	0.02	0.02	14,400	0.014	0.022	8	1.30	0.007490	0.06000	0.09	0.0350	1.43
6452	6288	8.7	8.7	0.0	0.0	137.0	209.0	54,850	0.08	0.08	54,850	0.055	0.085	6	0.60	0.090443	0.15000	0.30	0.1982	1.71
6453	6286	5.7	5.7	0.0	0.0	231.0	231.0	54,750	0.08	0.08	54,750	0.055	0.085	8	0.71	0.038535	0.12667	0.19	0.1039	1.83
6286	6288	0.0	5.7	0.0	0.0	0.0	231.0	54,750	0.08	0.08	54,750	0.055	0.085	8	0.15	0.083838	0.19333	0.29	0.1890	1.01
6288	6269	7.4	21.8	0.0	0.0	0.0	440.0	120,700	0.19	0.19	120,700	0.121	0.187	8	0.30	0.130693	0.24000	0.36	0.2546	1.65
6269	6270	7.3	29.1	0.0	0.0	0.0	440.0	131,650	0.20	0.20	131,650	0.132	0.204	8	0.30	0.142549	0.25333	0.38	0.2739	1.67
6270	6271	22.2	51.3	0.0	0.0	0.0	440.0	164,950	0.26	0.26	164,950	0.165	0.255	10	3.37	0.029391	0.14167	0.17	0.0885	4.15
328	326	0.0	0.0	0.0	0.0	20.0	20.0	4,000	0.01	0.01	4,000	0.004	0.006	8	1.80	0.001768	0.02667	0.04	0.0105	1.33
326	324	0.0	0.0	0.0	0.0	20.0	40.0	8,000	0.01	0.01	8,000	0.008	0.012	8	1.80	0.003536	0.04000	0.06	0.0192	1.45
324	322	0.0	0.0	0.0	0.0	20.0	60.0	12,000	0.02	0.02	12,000	0.012	0.019	8	1.80	0.005305	0.05333	0.08	0.0294	1.42
322	320	0.0	0.0	0.0	0.0	0.0	60.0	12,000	0.02	0.02	12,000	0.012	0.019	8	1.80	0.005305	0.05333	0.08	0.0294	1.42
320	316	0.0	0.0	0.0	0.0	10.0	70.0	14,000	0.02	0.02	14,000	0.014	0.022	8	1.80	0.006189	0.05333	0.08	0.0294	1.66
316	314	0.0	0.0	0.0	0.0	10.0	80.0	16,000	0.02	0.02	16,000	0.016	0.025	8	1.80	0.007073	0.06000	0.09	0.0350	1.59
314	312	0.0	0.0	0.0	0.0	0.0	80.0	16,000	0.02	0.02	16,000	0.016	0.025	8	1.80	0.007073	0.06000	0.09	0.0350	1.59
313	312	0.0	0.0	0.0	0.0	10.0	10.0	2,000	0.00	0.00	2,000	0.002	0.003	8	1.00	0.001186	0.02667	0.04	0.0105	0.66
312	308	0.0	0.0	0.0	0.0	0.0	90.0	18,000	0.03	0.03	18,000	0.018	0.028	8	1.80	0.007957	0.06000	0.09	0.0350	1.79
308	304	0.0	0.0	0.0	0.0	0.0	90.0	18,000	0.03	0.03	18,000	0.018	0.028	8	1.80	0.007957	0.06000	0.09	0.0350	1.79
304	300	0.0	0.0	0.0	0.0	86.0	176.0	35,200	0.05	0.05	35,200	0.035	0.054	8	1.80	0.015560	0.08667	0.13	0.0600	2.04
300	104	0.0	0.0	0.0	0.0	0.0	176.0	35,200	0.05	0.05	35,200	0.035	0.054	8	1.80	0.015560	0.08667	0.13	0.0600	2.04
206	204	0.0	0.0	0.0	0.0	43.0	57.0	11,400	0.02	0.02	11,400	0.011	0.018	8	2.20	0.004651	0.04667	0.07	0.0242	1.67
204	201	0.0	0.0	0.0	0.0	0.0	57.0	11,400	0.02	0.02	11,400	0.011	0.018	8	1.30	0.006051	0.05333	0.08	0.0294	1.38
201	200	0.0	0.0	0.0	0.0	43.0	100.0	20,000	0.03	0.03	20,000	0.020	0.031	8	1.00	0.011882	0.07333	0.11	0.0470	1.48
200	104	0.0	0.0	0.0	0.0	86.0	186.0	37,200	0.06	0.06	37,200	0.037	0.058	8	3.70	0.011557	0.07333	0.11	0.0470	2.78
104	102	0.0	0.00	0.0	0.0	0.0	365.0	73,000	0.11	0.11	73,000	0.073	0.113	8	3.50	0.023142	0.10000	0.15	0.0739	3.44
102	100	0.0	0.00	0.0	0.0	0.0	365.0	73,000	0.11	0.11	73,000	0.073	0.113	8	9.70	0.013901	0.08000	0.12	0.0534	4.76
100	6452	0.0	0.00	0.0	0.0	0.0	365.0	73,000	0.11	0.11	73,000	0.073	0.113	8	1.00	0.043294	0.14000	0.21	0.1199	2.12
414	404	0.3	0.28	0.0	0.0	90.0	90.0	18,420	0.03	0.03	18,420	0.018	0.029	8	1.00	0.010924	0.07333	0.11	0.0470	1.36
404	402	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.03	18,420	0.018	0.029	8	1.00	0.010924	0.07333	0.11	0.0470	1.36
402	6452	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.03	18,420	0.018	0.029	8	1.00	0.010924	0.07333	0.11	0.0470	1.36

Total
878.0

Min Slope
0.15

Max dn/D
0.38

COM. = Commercial
IND. = Industrial
RES. = Residential
Note: 1 Commercial Acre = 1,500 gpd
1 Industrial Acre = 2,000 gpd
1 Residential EDU = 200 gpd
Peak Flow = 2.17 $(Q_A)^{0.95}$ [flows in cfs]

1 K' based on n = 0.013
2 dn/D using K' in Brater King Table 7-14
3 From Brater King Table 7-4 based on dn/D

DATE: 3/16/2020

JOB NUMBER: 930-012

SEWER STUDY SUMMARY

FOR: Palomar Heights - Alternative 2 Hickory & Fig Sewer Analysis - Peak Flows

BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1

REFER TO PLAN SHEET:

930-012
3/17/2020

FROM	TO	IN-LINE COM. NET ACRES	CUMULATIVE COM. NET ACRES	IN-LINE IND. NET ACRES	CUMULATIVE IND. NET ACRES	IN-LINE RES. EDUs	CUMULATIVE RES EDUs	AVG. COMBINED DRY WEATHER FLOW (GPD)	AVG. COMBINED DRY WEATHER FLOW (CFS)	PEAK FLOW (CFS)	COMBINED PEAK FLOW (DESIGN FLOW)			LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' [1]	dn (feet)	dn/D[2]	C_a for Velocity[3]	VELOCITY (f.p.s.)
											GPD	MGD	CFS							
513	511	0.0	0.0	0.0	0.0	14.0	14.0	2,800	0.00	0.01	6,961	0.007	0.011	8	3.00	0.002384	0.03333	0.05	0.0147	1.65
511	509	0.0	0.0	0.0	0.0	14.0	28.0	5,600	0.01	0.02	13,684	0.014	0.021	8	3.00	0.004685	0.04667	0.07	0.0242	1.97
509	507	0.0	0.0	0.0	0.0	14.0	42.0	8,400	0.01	0.03	20,319	0.020	0.031	8	2.30	0.007946	0.06000	0.09	0.0350	2.02
529	527	0.0	0.0	0.0	0.0	3.0	3.0	600	0.00	0.00	1,550	0.002	0.002	8	1.00	0.000919	0.02000	0.03	0.0069	0.78
527	507	0.0	0.0	0.0	0.0	15.0	18.0	3,600	0.01	0.01	8,894	0.009	0.014	8	1.00	0.005275	0.04667	0.07	0.0242	1.28
507	505	0.0	0.0	0.0	0.0	0.0	60.0	12,000	0.02	0.04	28,769	0.029	0.045	8	6.40	0.006744	0.05333	0.08	0.0294	3.41
521	505	0.0	0.0	0.0	0.0	12.0	72.0	14,400	0.02	0.05	34,366	0.034	0.053	8	1.00	0.020381	0.09333	0.14	0.0668	1.79
505	503	0.0	0.0	0.0	0.0	0.0	72.0	14,400	0.02	0.05	34,366	0.034	0.053	8	1.00	0.020381	0.09333	0.14	0.0668	1.79
503	501	0.0	0.0	0.0	0.0	0.0	72.0	14,400	0.02	0.05	34,366	0.034	0.053	8	45.00	0.003038	0.04000	0.06	0.0192	6.23
501	6452	0.0	0.0	0.0	0.0	0.0	72.0	14,400	0.02	0.05	34,366	0.034	0.053	8	1.30	0.017875	0.08667	0.13	0.0600	1.99
6452	6288	8.7	8.7	0.0	0.0	137.0	209.0	54,850	0.08	0.20	126,595	0.127	0.196	6	0.60	0.208745	0.23500	0.47	0.3627	2.16
6453	6286	5.7	5.7	0.0	0.0	231.0	231.0	54,750	0.08	0.20	126,370	0.126	0.196	8	0.71	0.088945	0.20000	0.30	0.1982	2.22
6286	6288	0.0	5.7	0.0	0.0	0.0	231.0	54,750	0.08	0.20	126,370	0.126	0.196	8	0.15	0.193510	0.30000	0.45	0.3428	1.28
6288	6269	7.4	21.8	0.0	0.0	0.0	440.0	120,700	0.19	0.42	273,140	0.273	0.423	8	0.30	0.295753	0.38667	0.58	0.4720	2.01
6269	6270	7.3	29.1	0.0	0.0	0.0	440.0	131,650	0.20	0.46	297,273	0.297	0.460	8	0.30	0.321884	0.40667	0.61	0.5020	2.06
6270	6271	22.2	51.3	0.0	0.0	0.0	440.0	164,950	0.26	0.57	370,372	0.370	0.573	10	3.37	0.065994	0.21667	0.26	0.1623	5.08
328	326	0.0	0.0	0.0	0.0	20.0	20.0	4,000	0.01	0.02	9,857	0.010	0.015	8	1.80	0.004357	0.04667	0.07	0.0242	1.42
326	324	0.0	0.0	0.0	0.0	20.0	40.0	8,000	0.01	0.03	19,375	0.019	0.030	8	1.80	0.008564	0.06000	0.09	0.0350	1.93
324	322	0.0	0.0	0.0	0.0	20.0	60.0	12,000	0.02	0.04	28,769	0.029	0.045	8	1.80	0.012717	0.07333	0.11	0.0470	2.13
322	320	0.0	0.0	0.0	0.0	0.0	60.0	12,000	0.02	0.04	28,769	0.029	0.045	8	1.80	0.012717	0.07333	0.11	0.0470	2.13
320	316	0.0	0.0	0.0	0.0	10.0	70.0	14,000	0.02	0.05	33,435	0.033	0.052	8	1.80	0.014780	0.08000	0.12	0.0534	2.18
316	314	0.0	0.0	0.0	0.0	10.0	80.0	16,000	0.02	0.06	38,084	0.038	0.059	8	1.80	0.016835	0.08667	0.13	0.0600	2.21
314	312	0.0	0.0	0.0	0.0	0.0	80.0	16,000	0.02	0.06	38,084	0.038	0.059	8	1.80	0.016835	0.08667	0.13	0.0600	2.21
313	312	0.0	0.0	0.0	0.0	10.0	10.0	2,000	0.00	0.01	5,014	0.005	0.008	8	1.00	0.002974	0.04000	0.06	0.0192	0.91
312	308	0.0	0.0	0.0	0.0	0.0	90.0	18,000	0.03	0.07	42,718	0.043	0.066	8	1.80	0.018883	0.09333	0.14	0.0668	2.23
308	304	0.0	0.0	0.0	0.0	0.0	90.0	18,000	0.03	0.07	42,718	0.043	0.066	8	1.80	0.018883	0.09333	0.14	0.0668	2.23
304	300	0.0	0.0	0.0	0.0	86.0	176.0	35,200	0.05	0.13	82,148	0.082	0.127	8	1.80	0.036313	0.12667	0.19	0.1039	2.75
300	104	0.0	0.0	0.0	0.0	0.0	176.0	35,200	0.05	0.13	82,148	0.082	0.127	8	1.80	0.036313	0.12667	0.19	0.1039	2.75
206	204	0.0	0.0	0.0	0.0	43.0	57.0	11,400	0.02	0.02	11,400	0.011	0.018	8	2.20	0.004651	0.04667	0.07	0.0242	1.67
204	201	0.0	0.0	0.0	0.0	0.0	57.0	11,400	0.02	0.02	11,400	0.011	0.018	8	1.30	0.006051	0.05333	0.08	0.0294	1.38
201	200	0.0	0.0	0.0	0.0	43.0	100.0	20,000	0.03	0.03	20,000	0.020	0.031	8	1.00	0.011882	0.07333	0.11	0.0470	1.48
200	104	0.0	0.0	0.0	0.0	86.0	186.0	37,200	0.06	0.06	37,200	0.037	0.058	8	3.70	0.011557	0.07333	0.11	0.0470	2.78
104	102	0.0	0.00	0.0	0.0	0.0	365.0	73,000	0.11	0.26	167,286	0.167	0.259	8	3.50	0.053031	0.15333	0.23	0.1365	4.27
102	100	0.0	0.00	0.0	0.0	0.0	365.0	73,000	0.11	0.26	167,286	0.167	0.259	8	9.70	0.031855	0.12000	0.18	0.0961	6.06
100	6452	0.0	0.00	0.0	0.0	0.0	365.0	73,000	0.11	0.26	167,286	0.167	0.259	8	1.00	0.099212	0.20667	0.31	0.2074	2.81
414	404	0.3	0.28	0.0	0.0	90.0	90.0	18,420	0.03	0.07	43,690	0.044	0.068	8	1.00	0.025911	0.10667	0.16	0.0811	1.88
404	402	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.07	43,690	0.044	0.068	8	1.00	0.025911	0.10667	0.16	0.0811	1.88
402	6452	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.07	43,690	0.044	0.068	8	1.00	0.025911	0.10667	0.16	0.0811	1.88

Total
878.0

Min Slope
0.15

Max dn/D
0.61

COM. = Commercial
IND. = Industrial
RES. = Residential
Note: 1 Commercial Acre = 1,500 gpd
1 Industrial Acre = 2,000 gpd
1 Residential EDU = 200 gpd
Peak Flow = 2.17 $(Q_A)^{0.95}$ [flows in cfs]

1 K' based on n = 0.013
2 dn/D using K' in Brater King Table 7-14
3 From Brater King Table 7-4 based on dn/D

DATE: 3/17/2020

JOB NUMBER: 930-012

SEWER STUDY SUMMARY

FOR: Palomar Heights - Alternative 2 Hickory & Fig Sewer Analysis - Peak Flows with 10" Upgrade in Fig Street

BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1

REFER TO PLAN SHEET:

FROM	TO	IN-LINE COM. NET ACRES	CUMULATIVE COM. NET ACRES	IN-LINE IND. NET ACRES	CUMULATIVE IND. NET ACRES	IN-LINE RES. EDUs	CUMULATIVE RES EDUs	AVG. COMBINED DRY WEATHER FLOW (GPD)	AVG. COMBINED DRY WEATHER FLOW (CFS)	PEAK FLOW (CFS)	COMBINED PEAK FLOW (DESIGN FLOW)			LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' [1]	dn (feet)	dn/D[2]	C_a for Velocity[3]	VELOCITY (f.p.s.)
											GPD	MGD	CFS							
513	511	0.0	0.0	0.0	0.0	14.0	14.0	2,800	0.00	0.01	6,961	0.007	0.011	8	3.00	0.002384	0.03333	0.05	0.0147	1.65
511	509	0.0	0.0	0.0	0.0	14.0	28.0	5,600	0.01	0.02	13,684	0.014	0.021	8	3.00	0.004685	0.04667	0.07	0.0242	1.97
509	507	0.0	0.0	0.0	0.0	14.0	42.0	8,400	0.01	0.03	20,319	0.020	0.031	8	2.30	0.007946	0.06000	0.09	0.0350	2.02
529	527	0.0	0.0	0.0	0.0	3.0	3.0	600	0.00	0.00	1,550	0.002	0.002	8	1.00	0.000919	0.02000	0.03	0.0069	0.78
527	507	0.0	0.0	0.0	0.0	15.0	18.0	3,600	0.01	0.01	8,894	0.009	0.014	8	1.00	0.005275	0.04667	0.07	0.0242	1.28
507	505	0.0	0.0	0.0	0.0	0.0	60.0	12,000	0.02	0.04	28,769	0.029	0.045	8	6.40	0.006744	0.05333	0.08	0.0294	3.41
521	505	0.0	0.0	0.0	0.0	12.0	72.0	14,400	0.02	0.05	34,366	0.034	0.053	8	1.00	0.020381	0.09333	0.14	0.0668	1.79
505	503	0.0	0.0	0.0	0.0	0.0	72.0	14,400	0.02	0.05	34,366	0.034	0.053	8	1.00	0.020381	0.09333	0.14	0.0668	1.79
503	501	0.0	0.0	0.0	0.0	0.0	72.0	14,400	0.02	0.05	34,366	0.034	0.053	8	45.00	0.003038	0.04000	0.06	0.0192	6.23
501	6452	0.0	0.0	0.0	0.0	0.0	72.0	14,400	0.02	0.05	34,366	0.034	0.053	8	1.30	0.017875	0.08667	0.13	0.0600	1.99
6452	6288	8.7	8.7	0.0	0.0	137.0	209.0	54,850	0.08	0.20	126,595	0.127	0.196	6	0.60	0.208745	0.23500	0.47	0.3627	2.16
6453	6286	5.7	5.7	0.0	0.0	231.0	231.0	54,750	0.08	0.20	126,370	0.126	0.196	8	0.71	0.088945	0.20000	0.30	0.1982	2.22
6286	6288	0.0	5.7	0.0	0.0	0.0	231.0	54,750	0.08	0.20	126,370	0.126	0.196	8	0.15	0.193510	0.30000	0.45	0.3428	1.28
6288	6269	7.4	21.8	0.0	0.0	0.0	440.0	120,700	0.19	0.42	273,140	0.273	0.423	10	0.30	0.163118	0.34167	0.41	0.3032	2.01
6269	6270	7.3	29.1	0.0	0.0	0.0	440.0	131,650	0.20	0.46	297,273	0.297	0.460	10	0.30	0.177530	0.35833	0.43	0.3229	2.05
6270	6271	22.2	51.3	0.0	0.0	0.0	440.0	164,950	0.26	0.57	370,372	0.370	0.573	10	3.37	0.065994	0.21667	0.26	0.1623	5.08
328	326	0.0	0.0	0.0	0.0	20.0	20.0	4,000	0.01	0.02	9,857	0.010	0.015	8	1.80	0.004357	0.04667	0.07	0.0242	1.42
326	324	0.0	0.0	0.0	0.0	20.0	40.0	8,000	0.01	0.03	19,375	0.019	0.030	8	1.80	0.008564	0.06000	0.09	0.0350	1.93
324	322	0.0	0.0	0.0	0.0	20.0	60.0	12,000	0.02	0.04	28,769	0.029	0.045	8	1.80	0.012717	0.07333	0.11	0.0470	2.13
322	320	0.0	0.0	0.0	0.0	0.0	60.0	12,000	0.02	0.04	28,769	0.029	0.045	8	1.80	0.012717	0.07333	0.11	0.0470	2.13
320	316	0.0	0.0	0.0	0.0	10.0	70.0	14,000	0.02	0.05	33,435	0.033	0.052	8	1.80	0.014780	0.08000	0.12	0.0534	2.18
316	314	0.0	0.0	0.0	0.0	10.0	80.0	16,000	0.02	0.06	38,084	0.038	0.059	8	1.80	0.016835	0.08667	0.13	0.0600	2.21
314	312	0.0	0.0	0.0	0.0	0.0	80.0	16,000	0.02	0.06	38,084	0.038	0.059	8	1.80	0.016835	0.08667	0.13	0.0600	2.21
313	312	0.0	0.0	0.0	0.0	10.0	10.0	2,000	0.00	0.01	5,014	0.005	0.008	8	1.00	0.002974	0.04000	0.06	0.0192	0.91
312	308	0.0	0.0	0.0	0.0	0.0	90.0	18,000	0.03	0.07	42,718	0.043	0.066	8	1.80	0.018883	0.09333	0.14	0.0668	2.23
308	304	0.0	0.0	0.0	0.0	0.0	90.0	18,000	0.03	0.07	42,718	0.043	0.066	8	1.80	0.018883	0.09333	0.14	0.0668	2.23
304	300	0.0	0.0	0.0	0.0	86.0	176.0	35,200	0.05	0.13	82,148	0.082	0.127	8	1.80	0.036313	0.12667	0.19	0.1039	2.75
300	104	0.0	0.0	0.0	0.0	0.0	176.0	35,200	0.05	0.13	82,148	0.082	0.127	8	1.80	0.036313	0.12667	0.19	0.1039	2.75
206	204	0.0	0.0	0.0	0.0	43.0	57.0	11,400	0.02	0.02	11,400	0.011	0.018	8	2.20	0.004651	0.04667	0.07	0.0242	1.67
204	201	0.0	0.0	0.0	0.0	0.0	57.0	11,400	0.02	0.02	11,400	0.011	0.018	8	1.30	0.006051	0.05333	0.08	0.0294	1.38
201	200	0.0	0.0	0.0	0.0	43.0	100.0	20,000	0.03	0.03	20,000	0.020	0.031	8	1.00	0.011882	0.07333	0.11	0.0470	1.48
200	104	0.0	0.0	0.0	0.0	86.0	186.0	37,200	0.06	0.06	37,200	0.037	0.058	8	3.70	0.011557	0.07333	0.11	0.0470	2.78
104	102	0.0	0.00	0.0	0.0	0.0	365.0	73,000	0.11	0.26	167,286	0.167	0.259	8	3.50	0.053031	0.15333	0.23	0.1365	4.27
102	100	0.0	0.00	0.0	0.0	0.0	365.0	73,000	0.11	0.26	167,286	0.167	0.259	8	9.70	0.031855	0.12000	0.18	0.0961	6.06
100	6452	0.0	0.00	0.0	0.0	0.0	365.0	73,000	0.11	0.26	167,286	0.167	0.259	8	1.00	0.099212	0.20667	0.31	0.2074	2.81
414	404	0.3	0.28	0.0	0.0	90.0	90.0	18,420	0.03	0.07	43,690	0.044	0.068	8	1.00	0.025911	0.10667	0.16	0.0811	1.88
404	402	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.07	43,690	0.044	0.068	8	1.00	0.025911	0.10667	0.16	0.0811	1.88
402	6452	0.0	0.28	0.0	0.0	0.0	90.0	18,420	0.03	0.07	43,690	0.044	0.068	8	1.00	0.025911	0.10667	0.16	0.0811	1.88

Total
878.0

Min Slope
0.15

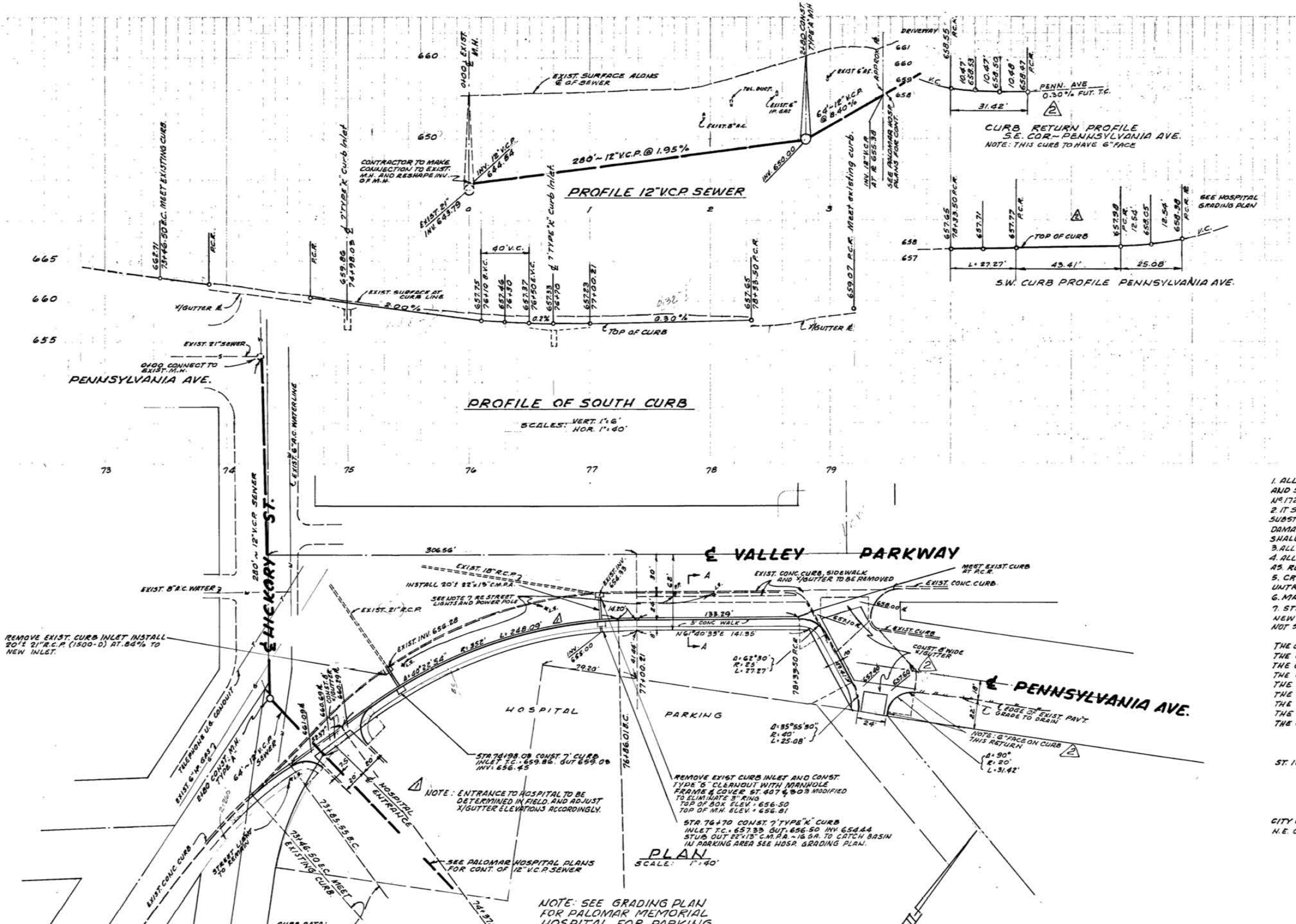
Max dn/D
0.47

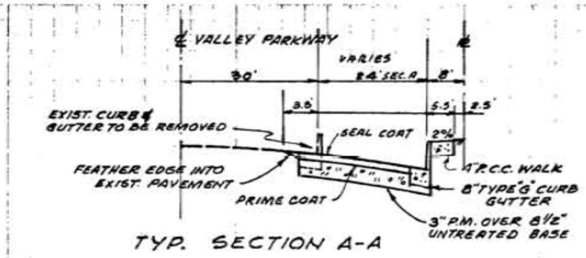
COM. = Commercial
IND. = Industrial
RES. = Residential
Note: 1 Commercial Acre = 1,500 gpd
1 Industrial Acre = 2,000 gpd
1 Residential EDU = 200 gpd
Peak Flow = 2.17 $(Q_A)^{0.95}$ [flows in cfs]

1 K' based on n = 0.013
2 dn/D using K' in Brater King Table 7-14
3 From Brater King Table 7-4 based on dn/D

APPENDIX D

AS-BUILT DRAWING FOR
12-INCH SEWER LINE IN HICKORY STREET

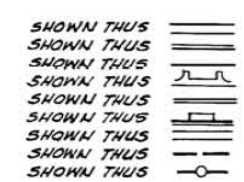




·WORK TO BE DONE·

1. ALL WORK TO BE DONE IN ACCORDANCE WITH THE STANDARD DRAWINGS AND SPECIFICATIONS OF THE CITY OF ESCONDIDO AS ADOPTED BY RESOLUTION Nº 1724 AND AMENDMENTS THERETO.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL SUBSTRUCTURES WHETHER SHOWN HEREON OR NOT, AND PROTECT THEM FROM DAMAGE. THE EXPENSE OF REPAIR OR REPLACEMENT OF SAID SUBSTRUCTURES SHALL BE BORNE BY THE CONTRACTOR.
3. ALL CURB DATA REFERS TO FACE OF CURB.
4. ALL STREET NAME, WARNING AND REGULATORY SIGNS TO BE RELOCATED AS REQUIRED BY ENGINEER.
5. CROSS GUTTERS AND RETURN SEGMENTS SHALL BE PLACED OVER 4" UNTREATED BASE TYPE "B"
6. MANHOLES SHALL HAVE WROUGHT IRON STEPS.
7. STREET LIGHTS AND POWER POLE TO BE RELOCATED BEHIND NEW CURB. STREET LIGHT WIRING UNDERGROUND THE EXACT LOCATION NOT SHOWN.

THE CONSTRUCTION OF BASE, P.M. PAVING — SHOWN THUS
THE CONSTRUCTION OF TYPE "G" CURB & GUTTER — SHOWN THUS
THE CONSTRUCTION OF 6" STD. CONC. CURB — SHOWN THUS
THE CONSTRUCTION OF CONC. CROSS GUTTER — SHOWN THUS
THE CONSTRUCTION OF STORM CULVERTS — SHOWN THUS
THE CONSTRUCTION OF CURB INLETS — SHOWN THUS
THE CONSTRUCTION OF 4" P.C.C. SIDEWALKS — SHOWN THUS
THE CONSTRUCTION OF V.C.P. SEWER — SHOWN THUS
THE CONSTRUCTION OF TYPE "A" MANHOLES — SHOWN THUS



STANDARD DRAWINGS

ST. 104, 108, 109, 115, 117, 303, 405 & 407, 107, 300.

BENCH MARK

CITY OF ESCONDIDO #20-A □ CUT ON CURB, CENTER OF CURB RETURN N.E. CORNER HICKORY AND VALLEY PARKWAY ELEV. 655.40.

PREPARED BY
TANNER MARQUARDT & ASSOC., INC.
CIVIL ENGINEERS
230 W. THIRD AVE., ESCONDIDO, CALIF.

REVISIONS				
NO.	CHANGE	BY	DATE	APPROVED
1	REVISED CURB LINE			
2	REV. CURB ELEV. PENN. AVE.			

SHEET 1 | CITY OF ESCONDIDO | 1 SHEETS

PLANS FOR THE IMPROVEMENT OF
VALLEY PARKWAY
HICKORY STREET TO PENNSYLVANIA AVENUE.

APPROVED: John W. Williams, CITY ENGINEER
DATE: 11-27-67
SCALE: AS SHOWN
APPROVED FOR DESIGN: John F. Tanner, J.F. TANNER R.C.E. 9525
DRAWING NO. 1535-1

J# 9193-T-163

FILMED: 3/26/92

APPENDIX E

OFFSITE SEWER SYSTEM ANALYSIS
FOR
PALOMAR HEIGHTS
ALTERNATIVE 1 – HICKORY STREET
EXISTING FLOWS PLUS PROJECT FLOWS

DATE: 3/12/2020

SEWER STUDY SUMMARY

FOR: Palomar Heights - Offsite Sewer Analysis, Build-Out Project Avg. Flow

SHT 1 OF 1

JOB NUMBER: 930-012

BY: Dexter Wilson Engineering, Inc.

REFER TO PLAN SHEET:

FROM	TO	IN-LINE COM. NET ACRES	CUMULATIVE COM. NET ACRES	IN-LINE IND. NET ACRES	CUMULATIVE IND. NET ACRES	IN-LINE RES. EDUs	CUMULATIVE RES EDUs	AVG. COMBINED DRY WEATHER FLOW (GPD)	AVG. COMBINED DRY WEATHER FLOW (CFS)	LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' (1)	dn (feet)	dn/D(2)	C_a for Velocity(3)	VELOCITY (f.p.s.)
6452	6288	0.28	0.28	0.0	0.0	510	510	102,420	0.16	12	1.95	0.014754	0.12000	0.12	0.0534	2.97

Min Slope
1.95

Max dn/D
0.12

COM. = Commercial
IND. = Industrial
RES. = Residential
Note: 1 Commercial Acre = 1,500 gpd
1 Industrial Acre = 2,000 gpd
1 Residential EDU = 200 gpd
Peak Flow = 2.17 $(Q_A)^{0.95}$ [flows in cfs]

1 K' based on n = 0.013
2 dn/D using K' in Brater King Table 7-14
3 From Brater King Table 7-4 based on dn/D

DATE: 3/12/2020

SEWER STUDY SUMMARY

FOR: Palomar Heights - Offsite Sewer Analysis, Build-Out Project Peak Flow

SHT 1 OF 1

JOB NUMBER: 930-012

BY: Dexter Wilson Engineering, Inc.

REFER TO PLAN SHEET:

FROM	TO	IN-LINE COM. NET ACRES	CUMULATIVE COM. NET ACRES	IN-LINE IND. NET ACRES	CUMULATIVE IND. NET ACRES	IN-LINE RES. EDUs	CUMULATIVE RES EDUs	AVG. COMBINED DRY WEATHER FLOW (GPD)	COMBINED PEAK FLOW (DESIGN FLOW)			LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' (1)	dn (feet)	dn/D(2)	C_a for Velocity(3)	VELOCITY (f.p.s.)
									GPD	MGD	CFS							
6452	6288	0.28	0.28	0.0	0.0	510	510	102,420	232,726	0.233	0.360	12	1.95	0.033524	0.18000	0.18	0.0961	3.75

Min Slope
1.95

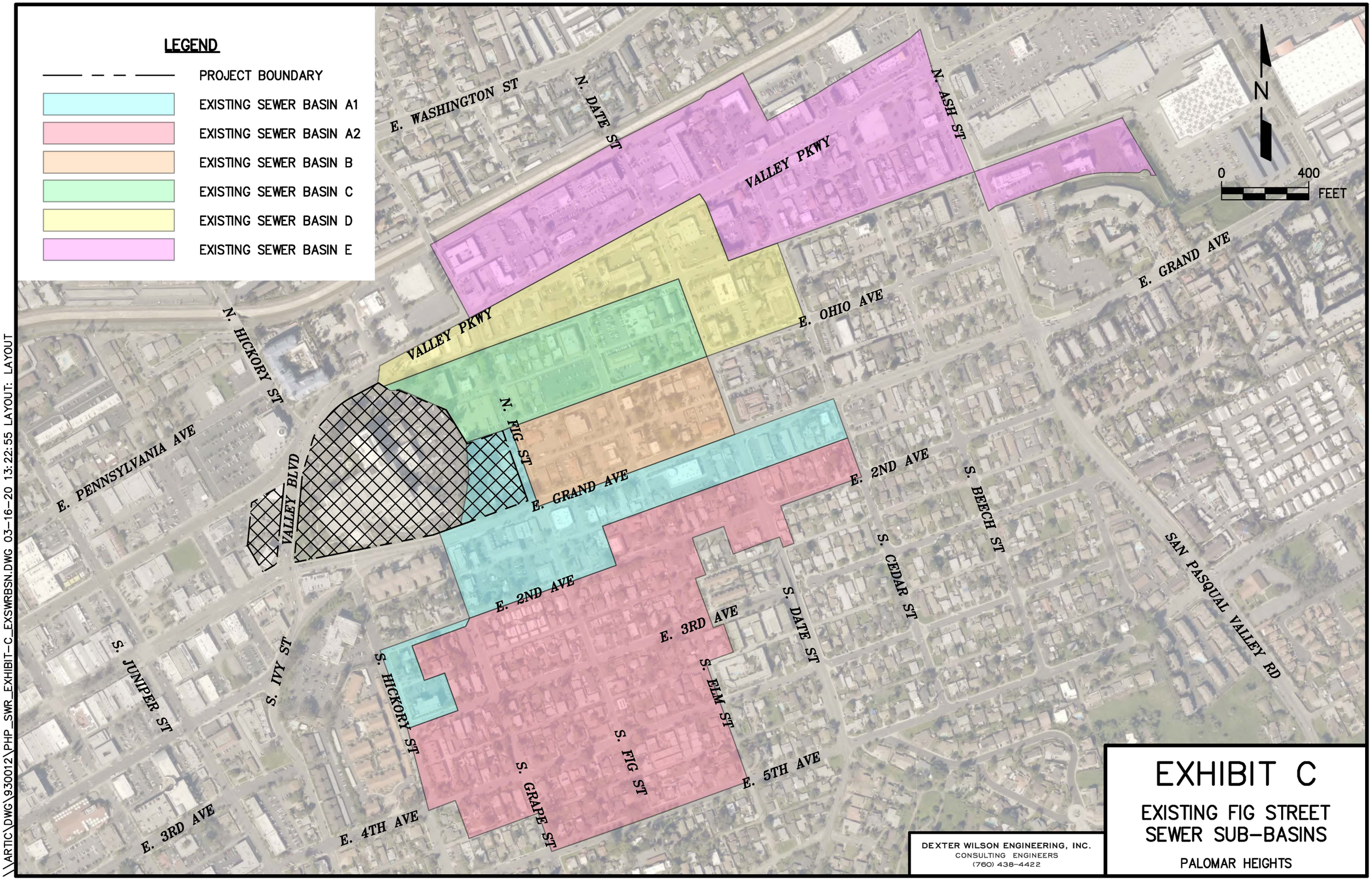
Max dn/D
0.18

COM. = Commercial
IND. = Industrial
RES. = Residential
Note: 1 Commercial Acre = 1,500 gpd
1 Industrial Acre = 2,000 gpd
1 Residential EDU = 200 gpd
Peak Flow = 2.17 $(Q_A)^{0.95}$ [flows in cfs]

1 K' based on n = 0.013
2 dn/D using K' in Brater King Table 7-14
3 From Brater King Table 7-4 based on dn/D

APPENDIX F

OFFSITE SEWER SYSTEM ANALYSIS
FOR
PALOMAR HEIGHTS
ALTERNATIVE 2 – FIG STREET
SEWER SUB-BASINS



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DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422

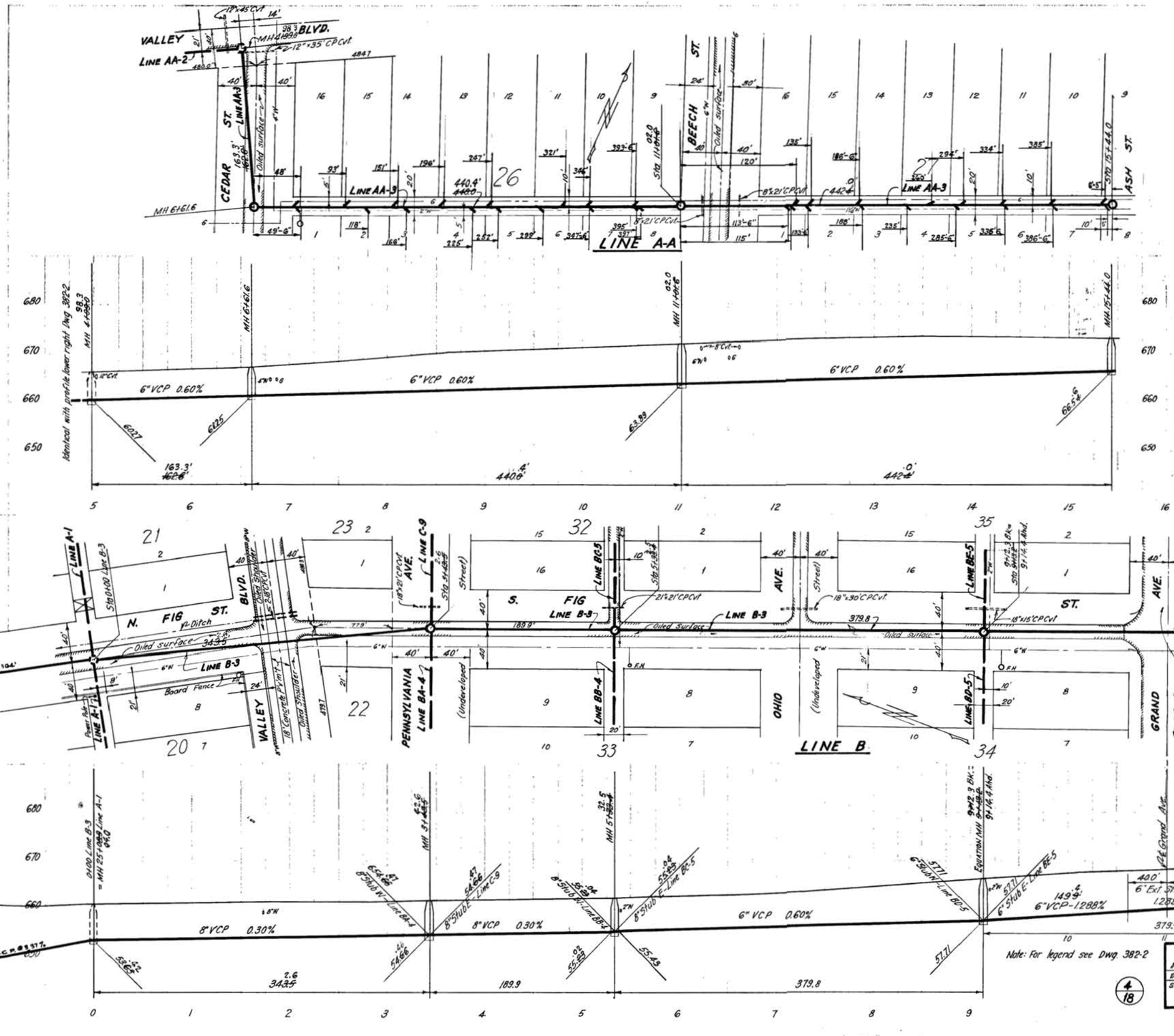
EXHIBIT C

EXISTING FIG STREET SEWER SUB-BASINS

PALOMAR HEIGHTS

APPENDIX G

AS-BUILT DRAWING FOR
6-INCH AND 8-INCH SEWERS IN FIG STREET



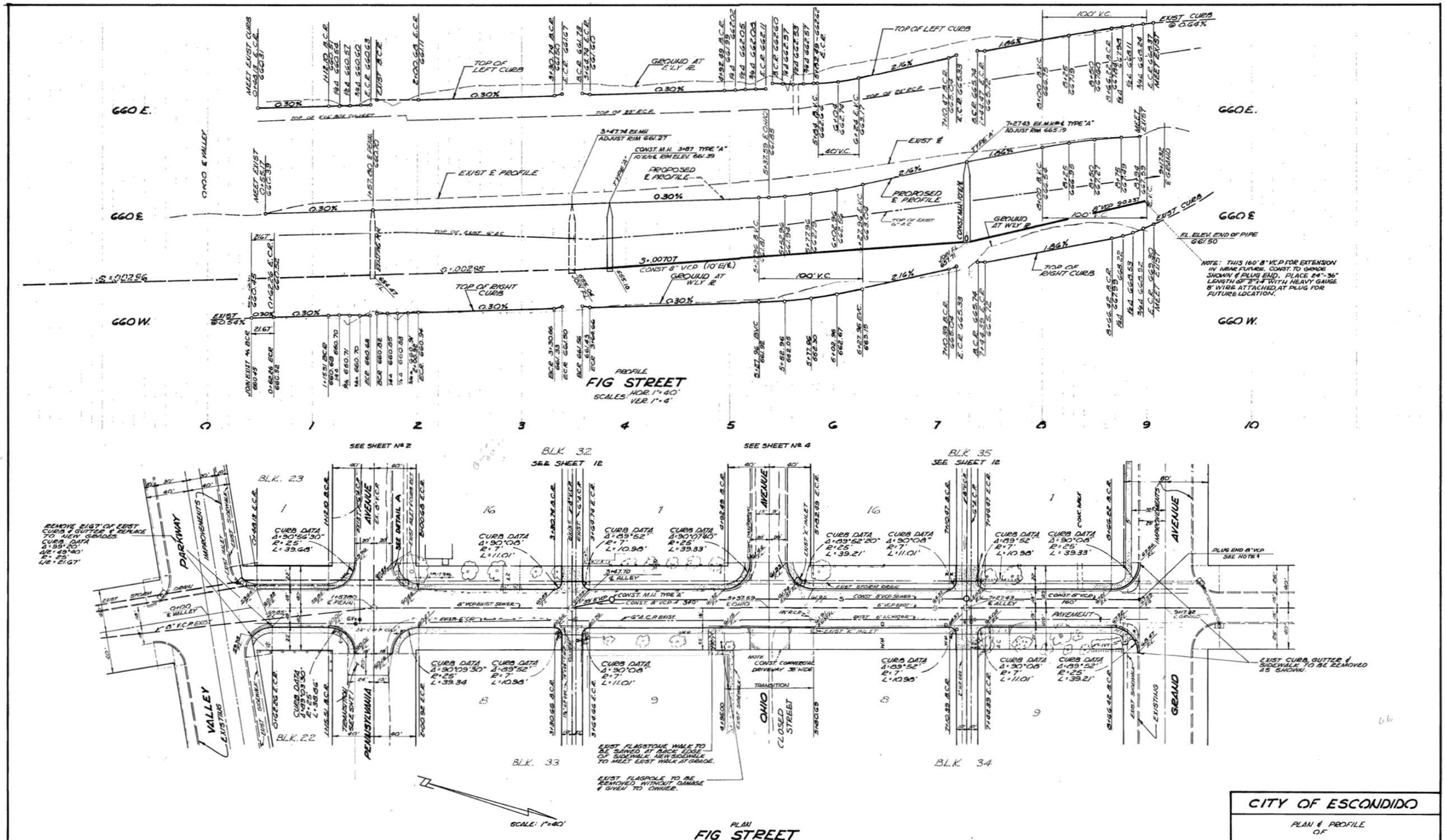
LUDWIG BROTHERS, ENGINEERS	CITY OF ESCONDIDO
PASADENA CALIFORNIA	SANITARY SEWERS
DRAWN 7-2-50 TRACED 10-2-50	LINES AA AND B
SCALES: HOR.: 1" = 50' VERT.: 1" = 10' APPROVED: 11-7-50 H. H. Ludwig REG ENGR NO. 7439	DWG. NO. L. B. 382-3

15 REVISED PLANS Nº 1-1951

4/18

FILMED: 4/30/92

File No. 3246



ROY L. KLEMA, ENGINEERS, INC.

BY: Roy L. Klema
ROY L. KLEMA R.C.E. 6486
LB. 54 & 106 FB. 7

CITY OF ESCONDIDO

PLAN & PROFILE OF

FIG STREET

VALLEY PKWY. - GRAND AVE.

APPROVED: Gordon A. Williamson DATE Oct 14, 1970
CITY ENGINEER - R.C.E. 9629

DRAWN WI. SCALE: AS NOTED SHEET 6 OF 15
DATE DWG. 1463

3/19/92

APPENDIX H

OFFSITE SEWER SYSTEM ANALYSIS
FOR
PALOMAR HEIGHTS
ALTERNATIVE 2 – FIG STREET
EXISTING FLOWS

DATE: 2/13/2020

SEWER STUDY SUMMARY

FOR: Palomar Heights - Fig Street Sewer Analysis - Existing Flows Only

SHT 1 OF 1

JOB NUMBER: 930-012

BY: Dexter Wilson Engineering, Inc.

REFER TO PLAN SHEET:

FROM	TO	IN-LINE COM. NET ACRES	CUMULATIVE COM. NET ACRES	IN-LINE IND. NET ACRES	CUMULATIVE IND. NET ACRES	IN-LINE RES. EDUs	CUMULATIVE RES EDUs	AVG. COMBINED DRY WEATHER FLOW (GPD)	COMBINED PEAK FLOW (DESIGN FLOW)			LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' (1)	dn (feet)	dn/D(2)	C_a for Velocity(3)	VELOCITY (f.p.s.)	COMMENTS
									GPD	MGD	CFS								
6452	6288	10.1	10.1	0.0	0.0	368	368	88,750	202,388	0.202	0.313	6	0.60	0.333721	0.31500	0.63	0.5210	2.40	Sub-basin A1 and A2 flows added.
6453	6286	5.7	5.7	0.0	0.0	0	0	8,550	20,672	0.021	0.032	8	0.71	0.014550	0.08000	0.12	0.0534	1.35	Sub-basin B flow added.
6286	6288	0.0	5.7	0.0	0.0	0	0	8,550	20,672	0.021	0.032	8	0.15	0.031655	0.12000	0.18	0.0961	0.75	
6288	6269	7.4	23.2	0.0	0.0	0	368	108,400	245,965	0.246	0.381	8	0.30	0.266329	0.36000	0.54	0.4330	1.98	Sub-basin C flow added.
6269	6270	7.3	30.5	0.0	0.0	0	368	119,350	270,161	0.270	0.418	8	0.30	0.292527	0.38667	0.58	0.4720	1.99	Sub-basin D flow added.
6270	6271	22.2	52.7	0.0	0.0	0	368	152,650	343,419	0.343	0.531	10	3.37	0.061191	0.20833	0.25	0.1535	4.98	Sub-basin E flow added.

Min Slope
0.15

Max dn/D
0.63

COM. = Commercial
IND. = Industrial
RES. = Residential
Note: 1 Commercial Acre = 1,500 gpd
1 Industrial Acre = 2,000 gpd
1 Residential EDU = 200 gpd
Peak Flow = 2.17 $(Q_A)^{0.95}$ [flows in cfs]

1 K' based on n = 0.013
2 dn/D using K' in Brater King Table 7-14
3 From Brater King Table 7-4 based on dn/D

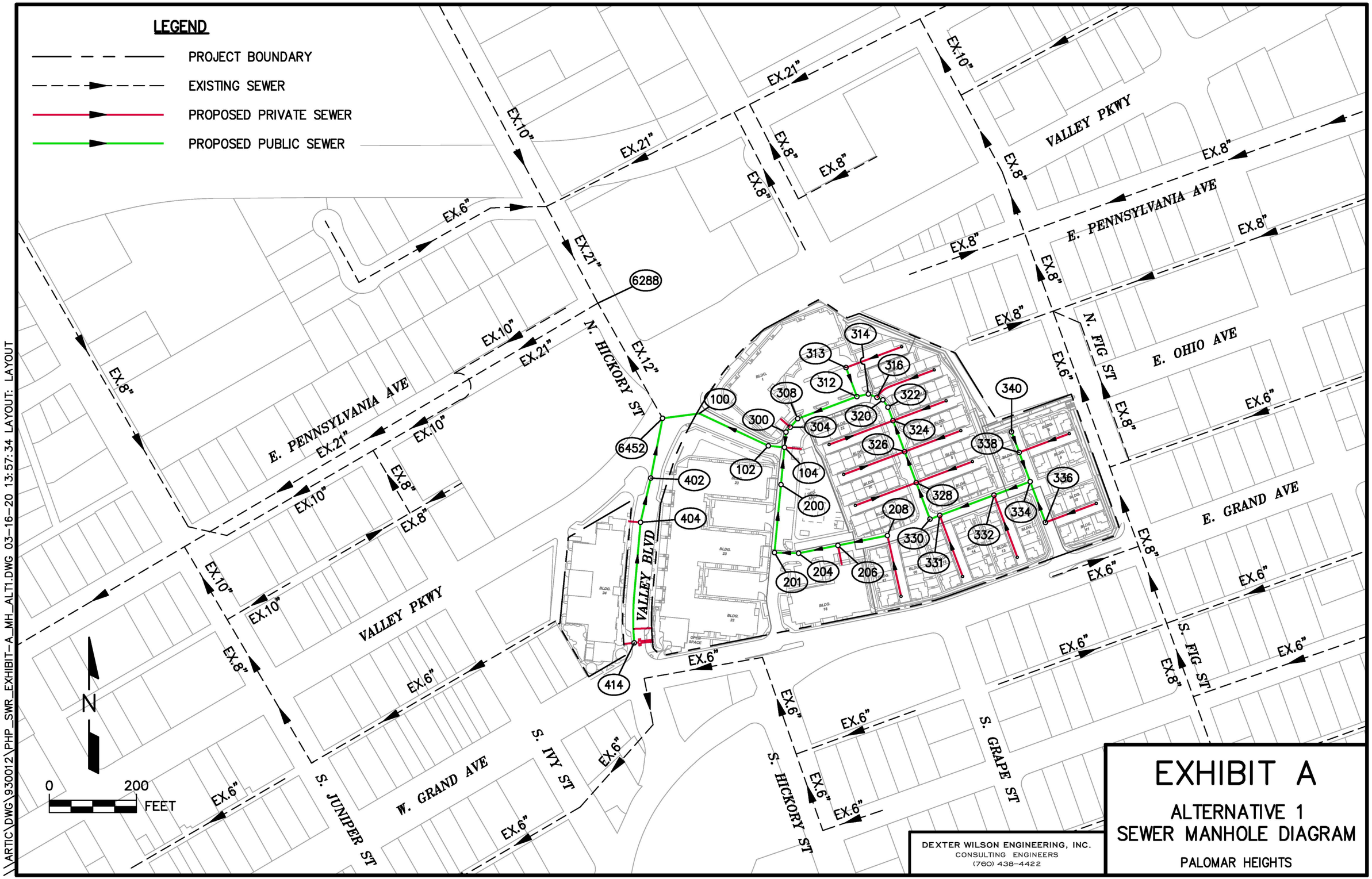


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EXHIBIT A

ALTERNATIVE 1
SEWER MANHOLE DIAGRAM

PALOMAR HEIGHTS

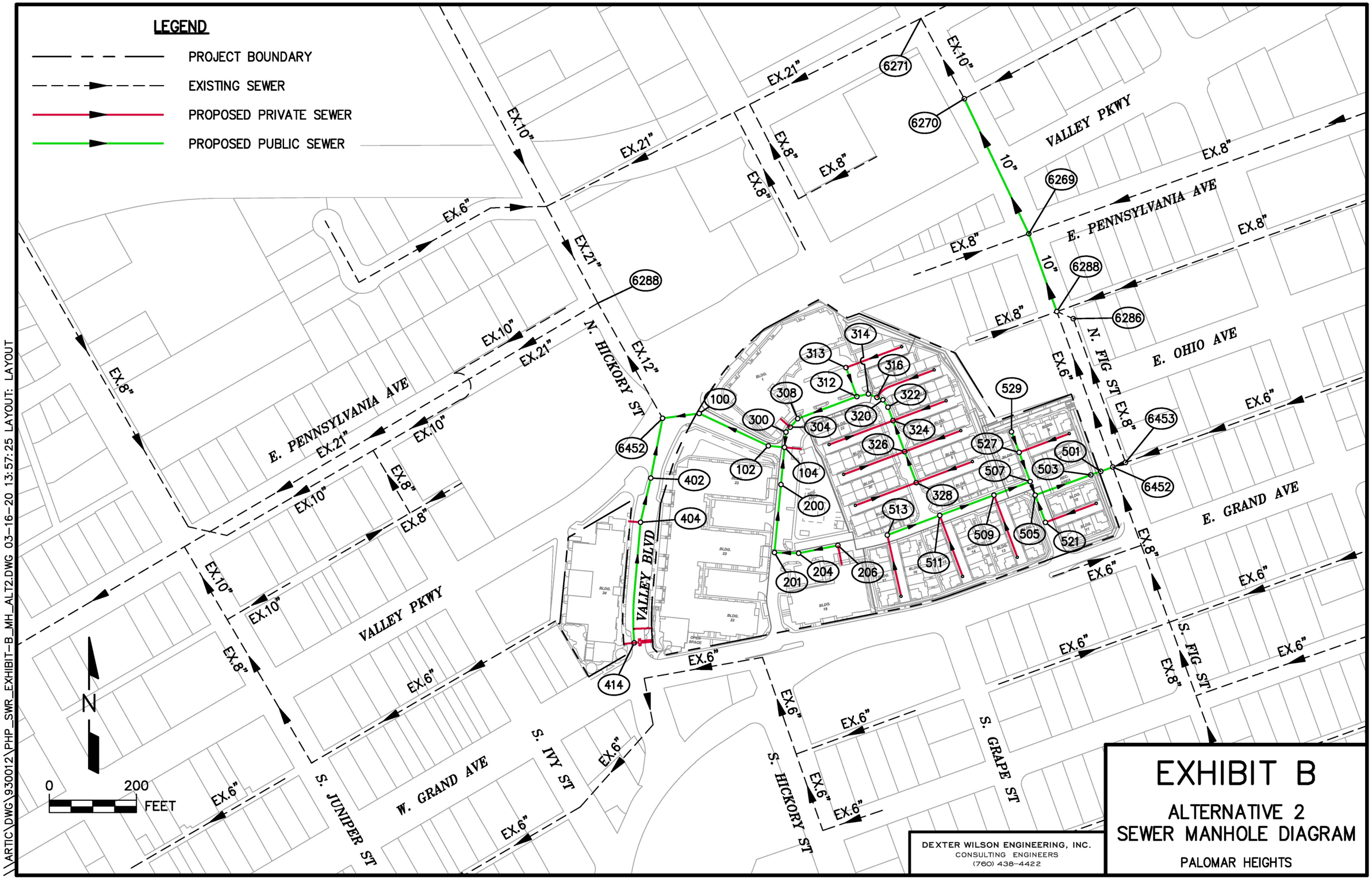

EXHIBIT B

ALTERNATIVE 2
SEWER MANHOLE DIAGRAM

PALOMAR HEIGHTS

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